Upgrading tradition: is there evidence of sectorial upgrading in the Portuguese wine industry?

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Abstract

In this work we analyze quality upgrading in a traditionally exporting activity: the Portuguese wine industry. Despite remaining an important center of production and export of wine – Portugal ranked 11 and 10 in world's top producer and exporter countries in 2011, respectively (OIV, 2013) –, and being the home for one of the most recognized fortified wines in the world (Port wine), to our knowledge, such an account has not yet been performed. It is our purpose to fill this gap in the literature, contributing to a greater understanding of the sector's dynamics and its effective capability of building export capacities and compete in higher segment market niches.

The empirical analysis is performed using an innovative methodology, based on the computation and interpretation of a wide variety of quality measures some of which are only available for the wine industry. The analysis of the upgrading dynamics of the sector since the 1990s takes into account the so-called market dimension, which evaluates quality through unit values and is most commonly used in empirical research on quality; but also considers industrial innovation, "soft innovation", protected designation of origin and quality ratings attributed by international specialty publications.

The results indicate that, although Portugal has been exporting a greater share of wines with high value added (wines with protected designation of origin), and while the average score of Portuguese wines in international specialty publications has been growing, such factors do not seem to be reflected on unit values. Although these findings may to some extent be related to an increase in international competition, they seem also to be indicative of a relative weakness of the sector, namely, its incapacity in building a strong international reputation/branding, which could be reflected in a greater willingness of consumers in paying higher prices.

Keywords: Heterogeneity, upgrading, international trade, value chains, wine, Portugal
JEL Codes: F14, O10, O30

Resumo

O presente trabalho analisa tendências de melhoria de qualidade (*quality upgrading*) numa atividade tradicionalmente exportadora: a indústria do vinho. Apesar de manter a sua posição enquanto importante centro de produção e exportação de vinho – Portugal posiciona-se no 11º e 10º lugares na lista de maiores produtores e exportadores mundiais de vinho em 2011, respetivamente (OIV, 2013) – e ainda que se trate do país de origem de um dos vinhos fortificados mais reconhecidos em todo o mundo (o vinho do Porto), esta tipologia de análise ainda não havia sido realizada. O presente trabalho tem como objetivo preencher esta lacuna na literatura, contribuindo para um melhor entendimento da dinâmica do setor e da sua capacidade de construir competências exportadores e ser competitivo em segmentos mais altos do mercado.

A análise empírica realiza-se com recurso a uma metodologia inovadora, com base no cálculo e interpretação de uma grande variedade de medidas de qualidade, algumas das quais estão exclusivamente disponíveis para a indústria vitivinícola. A análise das dinâmicas de melhoria de qualidade no setor desde os anos 90 tem em conta a dimensão de mercado, que avalia a qualidade através da análise de valores unitários e que é a mais comummente utilizada na investigação empírica sobre qualidade, mas considera ainda medidas de inovação industrial, *soft innovation*, designação de origem protegida e avaliações de qualidade conferidas pela imprensa internacional especializada.

Os resultados indicam que, apesar de Portugal exportar uma proporção cada vez maior de vinhos com alto valor acrescentado (vinhos com designação de origem protegida), e apesar da pontuação atribuída aos vinhos portugueses na imprensa internacional especializada estar a aumentar, tal não se repercute no valor unitário das exportações portuguesas de vinho. Apesar de ser possível que estes resultados estejam, em alguma medida, relacionados com um aumento da concorrência internacional, a evidência parece também apontar no sentido da incapacidade do setor em criar uma forte marca e reputação internacionais, o que poderia estimular a disponibilidade dos consumidores em pagar um preço superior.

Palavras-chave: Heterogeneidade, *upgrading*, comércio internacional, cadeias de valor, vinho, Portugal

Códigos JEL: F14, O10, O30

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Abbreviations

BERD	Business Expenditure on Research and Development
BT	Barrel tasted
CMO	Common Market Organisation
FDI	Foreign Direct Investment
COMTRADE	United Nations Commodity Trade Statistics Database
EAGF	European Agricultural Guarantee Fund
EEC	European Economic Community
EPO	European Patent Office
ESF	European Social Fund
EU	European Union
GDP	Gross Domestic Product
GVC	Global Value Chain
DOC	*Denominação de Origem Controlada*
DOP	*Denominação de Origem Protegida*
IG	*Indicação Geográfica*
IGP	*Indicação Geográfica Protegida*
INE	*Instituto Nacional de Estatística*
INPI	*Instituto Nacional de Propriedade Industrial*
INPI FR	*Institute National de la Propriété Industrielle*
IVV	Instituto da Vinha e do Vinho, I.P.
NW	New World
OBM	Own Brand Manufacturing
ODM	Own Design Manufacturer

OEA	Original Equipment Assembling
OEM	Original Equipment Manufacturing
OIV	International Organization of Wine and Vine
OW	Old World
R&D	Research and Development
RQE	Revealed Quality Elasticity
RUV	Relative Unit Value
SAWIS	South African Wine Industry Information & Systems
SME	Small and Medium Enterprises
SITC	Standard International Trade Classification
UNESCO	United Nations Educational, Scientific and Cultural Organization
UV	Unit Value
WIPO	World Intellectual Property Organization
WS	Wine Spectator
WTO	World Trade Organization

1. Introduction: motivation, objectives and research questions

With the progressive elimination of international trade barriers and the rise of strong, increasingly specialized competition from both developed and emerging economies (Amiti and Freund, 2010), strong pressure is put on countries in order to develop more effective production and more attractive products. Achieving and maintaining international competitiveness has become a key concept influencing countries' growth prospects and standards of living (Martin and Méjean, 2011; Hausmann *et al.*, 2007). In fact, the remarkable export performance of rapidly-growing emerging countries such as China puts exports in the agenda as one of the most significant ways to achieve sustained economic growth. As these new emerging economy competitors arrive, with lower unit labor costs, the only way out for high wage countries is to compete in quality. Furthermore, the importance of exports is highlighted by the depression of internal demand in developed economies such as Portugal, which is the focus of this work, whose firms try to compensate for the decline in domestic sales through increased efforts to export (Esteves and Rua, 2013).

Recent work in mainstream trade theory has emphasized heterogeneity in order to provide a better account of global trade (Melitz and Ottaviano, 2005; Bernard *et al.*, 2003). The Global Value Chain (GVC) theory also offers useful insights on how to upgrade by improving product quality, implementing more efficient processes, and acquiring new skills (Humphrey and Schmitz, 2002). "Upgrading" is defined as the dynamic movement within the value chain from one stage of production to another with higher value-added activities and increased benefits (Cattaneo *et al.*, 2013). This transition from low-quality to high-quality products is often seen as a necessary condition for export success and, ultimately, economic development (Khandelwal, 2010).

In this work we analyze quality upgrading in a traditionally exporting activity: the Portuguese wine industry [in the 19th century, wine represented more than 1/3 of Portugal's total exports (Afonso and Aguiar, 2004)]. Although this product accounts only for about 2% of actual exports (IVV, 2009), it remains a national cultural icon and part of the country's identity in the world, with government and industry seizing upon activities such as tourism as possible mechanisms to respond to problems of economic

restructuring and promote rural economic innovation and diversification (Pessoa, 2008; Hall and Mitchell, 2000).

The analysis of wine industry upgrading has been recently developed in a few studies focusing on countries such as South Africa, New Zealand and France (e.g. Crozet *et al.*, 2009; Ponte and Ewert, 2009; Gwynne, 2006), but to our knowledge, it has not yet been performed in the Portuguese case. The case of Portugal is particularly worthy of attention, though: Portugal is the 11th largest producer in the world according to OIV's latest statistical report on world viticulture (OIV, 2013), as well as one of the two countries with the highest percentage of surface under vine in relation to its total land area (2.6%, the same as Italy).[1] Portugal also had the third highest individual human consumption of wine in the world (42.6 liters per capita/year) in 2011 (OIV, 2013) and was the 10th largest exporter in 2011 (2.96 million hectoliters) (IVV, 2012). Besides, it is the home for one of the most recognized fortified wines in the world: Port wine.

Given the significant role played by this industry in the country and in its international trade flows, it is our purpose to fill this gap in the literature, contributing to a greater understanding of the sector's dynamics and of its effective capability of building export capacities and compete in high segment market niches. To this purpose, the dissertation is structured as follows: Chapter 2 provides a critical review of the literature on product heterogeneity and trade, considering the theoretical underpinnings of quality upgrading both from the perspective of the New Trade Theory, trade (section 2.1) and the Global Value Chain theory (section 2.2). A survey of recent empirical work focusing on quality upgrading is also included (section 2.3).

In Chapter 3 we describe the main characteristics of winemaking in Portugal (3.1) and provide a brief historical account of the industry's evolution in the country, since the first records of wine trade in the Iberian Peninsula (1st and 2nd B.C.) to the current days (sections 3.2 and 3.3). Furthermore, we explore recent trends from an international perspective, namely the main export destinations for Portuguese wine since the beginning of the century to the current days, along with a comparison between the evolution of the country's relative importance in global wine trade with that of other main players in the industry (section 3.4).

[1] Table A.1 in the Appendix provides a comparative view of this item for the major world wine producers

Chapter 4 is dedicated to the empirical work: firstly, we describe the various quality dimensions that will be under assessment (section 4.1) and then proceed with the methodological considerations that are relevant for each one of them, followed by their respective research results (sections 4.2, 4.3, 4.4, 4.5 and 4.6). Section 4.7 provides a synthesis and a systematization of the results.

Finally, Chapter 5 concludes by analyzing the policy implications of our findings as well as offering some guidelines for future research.

2. Quality upgrading: a survey of the literature

2.1. Does quality matter? Insights from the New Trade Theory

Since 1980, world trade has grown on average nearly twice as fast as world production (WTO, 2013). The progressive liberalization of trade, brought by multilateral and regional trade agreements, as well as the reduction in transport and communication costs, has lowered trade barriers and enabled increasing competition. Such changes created significant constraints for domestic low-productivity firms, while encouraging the highly productive to sell abroad, turning towards export markets.

From a theoretical perspective, this changing environment highlights the need to go beyond the country-level of analysis, which explores the dynamics of international trade based on factor endowments and average productivity levels, and move to the micro-level, investigating the links between firms' heterogeneity and their performance in integrated markets. This has indeed been the case: over the last decade, the literature on firm heterogeneity has expanded considerably, in an attempt to explain why some firms are able to compete and survive in the world market, whereas others are doomed to fail (e.g. Greenaway and Kneller, 2007; Helpman *et al*, 2004; Bernard *et al*, 2003; Melitz, 2003; Bernard and Jensen, 1999).

The stream of research in trade theory focusing on product/firm heterogeneity has its roots in Krugman's (1980) well-known work on the impact on trade of consumers' love of variety in the context of monopolistic competition. Krugman's trade model shows that every firm is a potential exporter, as it can produce a different variety of a given product that is demanded by a group of customers worldwide, explaining therefore the emergence of intra-industry trade. Although this theory already considered product heterogeneity, more recent works – which we will explore later in this chapter – shifted the focus of analysis from *product* to *performance* heterogeneity.

A major development on the topic of performance heterogeneity and a seminal piece of research is that of Melitz (2003), who built a model showing the dichotomous power of export market exposure: the more productive firms will enter the market, whereas the least productive will exit. The restructuring of the economy caused by the elimination of less productive firms would be beneficial from an aggregate point of

view, giving rise to macroeconomic productivity growth. This aspect had been largely neglected in previous theories of trade (cf. Bernard *et al*., 2011), which emphasized either inter-industry trade induced by comparative advantage (e.g., Ricardian and neoclassical trade theories), or intra-industry trade induced by consumer love of variety (Krugman, 1980).

More recently, Helpman *et al.* (2004) introduced a refinement in Melitz' work, distinguishing among four types of firms, according to their efficiency levels and the consequences of their exposure to international trade: the least productive firms will be forced to leave the industry; other low productive firms will serve their domestic markets only; the rest will serve both domestic and international markets. Within the latter, the most productive will enter external markets via foreign direct investment (FDI), whereas others would more likely choose to export.

From the perspective of cost-competitiveness, Bernard *et al.* (2003) have also demonstrated the existence of a link between exporting and productivity heterogeneity. According to the authors, under imperfect competition, more productive firms are more likely to export and have a lower domestic price. Melitz and Ottaviano (2005) add to this the consideration that higher firm productivity and lower mark-ups (i.e., cost competitiveness) are positively correlated with the size of the markets in which the firms are operating, as well as their level of integration on global trade. This model was empirically validated by Asplund and Nocke (2006), who relate their findings with the fact that larger markets normally present a higher number of active firms.[2] The conclusion drawn from this work, and perhaps the main lesson of the theory, is that market integration generates several positive effects on aggregate welfare, leading to more efficient production and lower prices.

From a microeconomic point of view, however, a main question arises: does a firm enter foreign markets when it is already efficient, or does the efficiency gain occur after it has entered those markets and faced increased competition? The direction of causation between productivity and internationalization, as Greenaway and Kneller (2007) describe it, is controversial. One side of the debate relies on the "learn by exporting" argument. This hypothesis states that firms who enter foreign markets

[2] Holding the distribution of firms' efficiencies constant, a larger market means that competition will be stronger as prices and margins fall.

develop a set of capabilities, mainly by acquiring knowledge from their international counterparts that may improve efficiency and quality (World Bank, 1993, 1991; Keesing and Lall, 1992; Grossman and Helpman, 1991; Westphal *et al.*, 1984). This view is empirically supported by Ederington and McCalman (2008), who find that the liberalization of trade tends to increase the rate of technology adoption, showing a positive relation between trade and innovation.

On the other hand, some authors have come up with empirical evidence that does not identify a clear "learning by exporting" pattern of causality. They argue instead that exporting firms are "self-selected" – only the more productive firms can export (Arnold and Hussinger, 2005; Bernard and Jensen, 2004, 1999; Isgut, 2001; Clerides *et al.*, 1998). Bernard and Jensen (2004, 1999), for instance, compare productivity growth between exporters and non-exporters and conclude that the differences are not significant. They argue that the learning effect can exist, but that it is very limited in time, affecting only the new exporters. Alvarez and López (2005) point out that firms learn "to export" instead of "by exporting", making pre-entry investments in order to become more competitive.

A broader theoretical approach has been recently developed by Bernard *et al.* (2007), in an attempt to combine the more recent stream of research on heterogeneous firms, which focuses on the links between productivity and foreign market entry, with neoclassical trade theory, which emphasizes comparative advantage and national factor endowments. The authors develop a theoretical model of comparative advantage that considers heterogeneous firms, concluding that trade raises industry productivity and average firm output in all sectors, but does so more significantly in those which have comparative advantage. This means that industries in which a given country already has a comparative advantage will become more productive, thus magnifying the initial advantage. Due to the inclusion of the heterogeneity factor, trade will create and destroy jobs in both comparative advantage industries and non-comparative advantage industries, unlike Heckscher-Ohlin-Samuelson's predictions. It also differs from neoclassical trade theory on the impact of trade on income distribution, as the productivity gains induced by heterogeneous firms alleviate the decline of the scarce factor's real wage in relation to what would happen in a purely neoclassical scenario, suggesting a shift from the Stolper-Samuelson theorem. This very comprehensive model seems to be an accurate framework for today's trade dynamics, bringing together

neoclassical trade theory and new trade theory. However, as economies become more integrated and factor mobility increases, endowment heterogeneity between countries (the main motivation for trade under the neoclassical framework) will become less significant for many industries than their firms' efficiency levels.

New trade theory and its developments also present valuable guidelines for trade analysis and policy. If we do accept that firms self-selectively enter the export market (even if there may be also some ex post productivity gains, especially during the initial phase of internationalization), then firms will make an effort to increase productivity in order to become exporters. This means that any variable that might affect the international profit prospect of a firm will also have an impact on productivity, including the effect of trade barriers (López, 2005). In this scenario, policy intervention can stimulate more conscious self-selection (Greenaway and Kneller, 2007), by implementing selective innovation policies (e.g., technology funding and cluster policy), and by identifying sectors in which the country has or can potentially benefit from comparative advantage, building sectorial competitiveness strategies to boost firms' abilities. This type of policy is coherent with the theory of trade put forward by Bernard *et al.* (2007), since it takes into account both comparative advantage and firm-level specific advantages.

So far, we have described the stream of research on the relationship between firm heterogeneity (in terms of productivity), initiated by Melitz (2003) by relying on the concept of productivity as *cost-efficiency*. His theory demonstrates the importance of firm differentiation, assuming that the most productive firms are those who are able to enter foreign markets with lower export prices.

However, as production costs cannot be reduced *ad eternum*, many firms nowadays are choosing to position themselves in international markets with an upgraded and differentiated product portfolio. Taking this into account, Baldwin and Harrigan (2011) developed a variant of the standard heterogeneity theory in which the most competitive firms are not those whose output has the lowest price, but instead the lowest *quality-adjusted* price. Hallak and Sivadasan (2011) and Fasil and Borota (2013) developed a partial-equilibrium heterogeneous-firm model with two sources of heterogeneity, productivity and caliber (the ability to produce quality using few fixed inputs), and an endogenous product quality.

A large body of empirical research has been demonstrating that cost might not be the only factor influencing a firm's ability to export. Schott (2004) and Hummels and Klenow (2005) found a positive relationship between the exporter country GDP per capita and quality; Hallak and Schott (2011) estimate product quality of exporters, both across countries and over time, by developing a method that allows for the decomposition between price and quality variation in unit values – if two countries with the same export prices have different global trade balances, then they must have products with different levels of quality. They find that the level of quality is correlated with the level of development, a conclusion that was also confirmed by Khandelwal (2010).

Verhoogen (2008) proposes a model which links productivity with quality differentiation. More productive plants produce higher-quality goods than less productive ones, and are willing to pay higher wages to keep a higher-quality workforce. The author also finds evidence in agreement with the model results, taking into account the Mexican manufacturing sector. Relative to Melitz's (2003) earlier contribution, in which firms are heterogeneous and only the most productive are able to export, he adds the premise that goods differ in quality and consumers differ in income and therefore, in their willingness to pay for product quality. In a similar vein, Johnson (2012) and Kugler and Verhoogen (2012) demonstrate that export prices in most sectors fit in a model in which high productivity firms choose to produce high quality goods and charge high prices. Manova and Zhang (2009) go even further: they argue that the cost factor can be irrelevant, since exporters that charge higher prices are those which import more expensive inputs, but they are also those which earn greater revenues. Iacovone and Javorcik (2012) find that, besides the fact that Mexican exporting firms charge higher prices, they also experience an increase in their price two years before they start exporting, along with increased investment in physical capital and technology licensing. Finally, by matching firm-level export data with expert assessments of the quality of champagne, Crozet *et al.* (2009)[3] have found that quality increases firm-level prices, the probability of market entry, and export values.

[3] This was, so far, the only empirical study based on data from the wine industry (and from the food and drinks industry in general) to be made from a firm heterogeneity/quality perspective.

2.2. The concept of upgrading in the Global Value Chain theory

As seen in the previous section, recent contributions in trade theory introduced important insights to the study of the links between firm heterogeneity and foreign market entry, through exports or FDI. Some of the latest developments on this stream of research have consistently shifted the focus from cost to quality-based competitiveness, highlighting the revenue enhancing features of competition based on high-value, even when it is accompanied by higher costs.

Such developments are consistent with the common realization that firms need to learn how to respond to new competition challenges in the global market from both developed and emerging economies, which are now competitive not only in labour-intensive goods, but also in capital-intensive ones (Amiti and Freund, 2010). Because only the more productive firms are able to enter the external market, the "self-selection" process requires the ability to improve performance and increase competitiveness. The literature suggests that one of the responses to the ever increasing challenges posed by fierce competition is to "upgrade" – to make better products, more efficiently, or move into more skilled activities (Humphrey and Schmitz, 2002).

The concept of *upgrading*, also defined as "the dynamic movement within the value chain from one stage of production to another with higher value-added activities and increased benefits" (Cattaneo *et al*., 2013, p.29), was identified by Porter (1990) as the key factor behind a nation's competitiveness. In his milestone book *The Competitive Advantage of Nations* (1990), the author states that competitive advantage is built upon innovation, arguing that the sustainability of that advantage can only be achieved by constantly upgrading it, *i.e*., moving to more sophisticated processes and products. The bottom line of this argument is, therefore, that competitiveness in globalized markets depends on the ability to innovate and "move upwards" in the value chain.

The relationship between competitiveness and upgrading has recently been empirically tested by Fernandes and Paunov (2013) who, using data from a set of Chilean firms, have showed that tougher import competition does have a significant positive impact on product quality and innovation. This happens not only because firms react to the import pressure by upgrading quality so as to differentiate their products, but also due to easier access to imported quality inputs.

With a strong empirical connection, the Global Value Chain (GVC) theory has also been providing useful and rather interesting insights about trade, and specifically about the process of upgrading. Literature on value chains is, therefore, a valuable complement to the New Trade Theory view on the importance of quality, presented in the previous section.

The *value chain* is defined as a collection of activities that are performed to design, produce, market, deliver and support a particular product (Kaplinsky, 2000; Porter, 1985), which can be contained within a single firm or divided among different firms (Gereffi and Fernandez-Stark, 2011). In a globalized world, both intra-firm and inter-firm activities of the value chain can be dispersed across the world, giving rise to the concept of *global value chains* (GVC). Upgrading in a global value chain takes place whenever firms, countries or regions move to higher value-added activities in order to increase the benefits (profits and capabilities, for instance) from participating in global production networks (Gereffi, 2005).

According to one of the main contributors in this research area – Gary Gereffi, the global value chain analysis provides a holistic view of global industries, both from the top down (global chain governance by lead firms), or bottom up (how business decisions affect economic and social upgrading or downgrading in specific regions) (cf. Gereffi and Fernandez-Stark, 2011). Gereffi was indeed the first author to introduce the concept of upgrading in the global value chain in order to describe a type of organizational learning that could improve the position of firms and nations in international trade, by moving to more profitable and/or technologically sophisticated capital and skill-intensive niches (Gereffi, 1999; Gereffi and Tam, 1998). His work focused on upgrading as a tool to understand how developing and especially emerging economies are able to become competitive, not only in labour-intensive industries, but also in capital-intensive ones (Amiti and Freund, 2010). In fact, from the standpoint of global value chain theory, upgrading is usually analyzed at the macro level and using a developmental approach: most of the recent works on upgrading in global value chains have focused on how developing and emerging country producers can reach sustained economic growth by upgrading (Gibbon *et al*., 2008; Gibbon, 2001). However, the concept of upgrading is all-encompassing and can be applied to different macro contexts, namely to countries with very diverse development levels. These contexts are

usually delimited not only by their geographical comprehensiveness (country/region) but also by their production scope (industry).

Building on the work of Gereffi (1999), several authors have provided a number of definitions of upgrading (Cattaneo *et al.*, 2013; McDermott, 2007; Giuliani et al, 2005; Pietrobelli and Rabellotti, 2004; Humphrey and Schmitz, 2002; Kaplinsky, 2000). The most concise is perhaps that of Pietrobelli and Rabelotti (2004, p. ii), who describe upgrading as "innovating to increase value added". McDermott (2007, p. 104) defines it as a "shift from lower to higher-value economic activities by using local innovative capacities to make continuous improvements in processes, products, and functions". This categorization is very frequent in global value chain analysis and specifically in the upgrading literature, and goes back to Humphrey and Schmitz's (2002) classification of the four different existing types of upgrading: product upgrading, process upgrading, functional upgrading, and inter-sectoral upgrading.

Table 1: Types of upgrading

Type of upgrading	Description	Examples	Trajectory
Process	Transforming inputs into outputs more efficiently by reorganizing the production system or introducing superior technology	• Original Equipment Assembly (OEA) • Original Equipment Manufacturer (OEM)	
Product	Moving into more sophisticated product lines	• Own Design Manufacture (ODM)	
Functional	Acquiring new functions (or abandoning existing functions) that increase the overall skill upgrading and introduce more sophisticated activities	• Own Brand Manufacture (OBM)	
Intersectoral	Moving into new productive activities	• Moving into different activities e.g. black and white TV tubes to computer monitors	

Source: Adapted from Humphrey and Schmitz (2002) and Kaplinsky and Morris (2002)

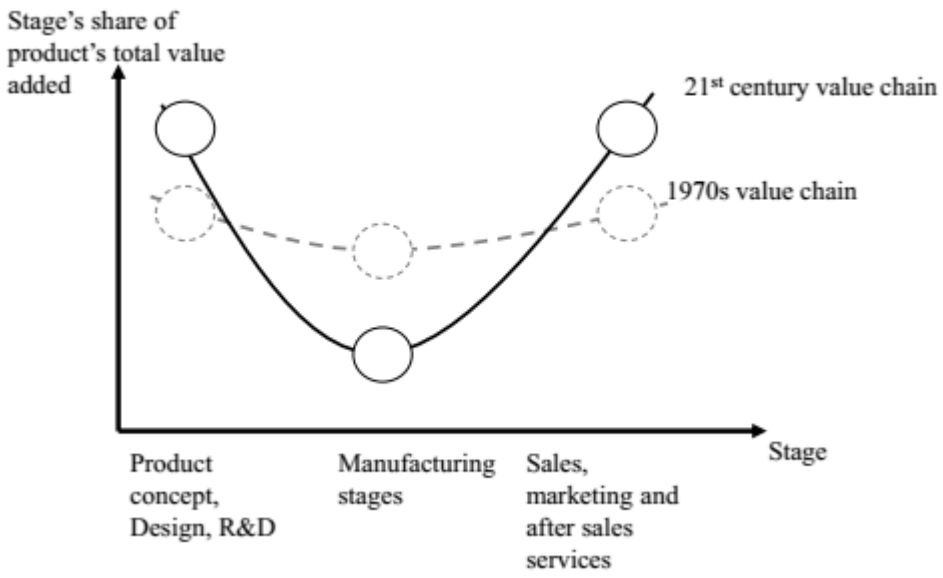
As described in Table 1, *process upgrading* requires more efficient internal processes; *product upgrading* consists in introducing new products or improving old ones in order to make them more sophisticated than those of the firm's competitors. *Functional upgrading* is achieved by integrating new functions, namely more knowledge-based functions. Finally, *inter-sectoral upgrading* (or *chain upgrading*) is the most complex form of upgrading, and consists in using competences that were acquired in one function of the chain to operate in a different sector/chain or even to move from one industry to another (Cattaneo *et al.*, 2013; Ponte and Ewert, 2009; Humphrey and Schmitz, 2002). All types of upgrading require an improvement in terms of knowledge-based capital. Product upgrading requires continuous innovation in areas such as advanced production technology, quality management and certification, taking into account changes in consumer preferences. It requires the firm to introduce new products or improve old ones faster than its rivals. Process upgrading demands the creation of know-how in process management and the implementation of integrated information technology (IT) solutions to support business processes. Functional upgrading focuses on pre-production and post-production activities (such as design and marketing/retail, respectively). Inter-sectoral upgrading is, above all, a management challenge – managers need to be skilled and flexible enough to be able to deal with new sectorial contexts (Kaplinsky and Morris, 2002, Kaplinsky *et al.*, 2002)

From the discussion above, it becomes clear that whilst product and process upgrading mean innovation within the same function of the value chain, functional and inter-sectoral upgrading are more complex, as they involve the engagement in a set of different activities which were previously not known or properly explored. Authors such as Hill (2000) see functional upgrading as an important strategy for businesses in which more traditional strategies to achieve competitiveness (such as price or quality), fail to deliver results. Developing activities that are outside of a firm's usual scope is, however, a complex task that cannot be accomplished in the short-run, as it requires the expansion of workforce skills to include new technical and organizational knowledge (Kaplinsky *et al.*, 2002). Along with the development of new competences, firms need to learn how to coordinate a wide range of different activities (before, during, and after the production phase), in order to operate efficiently and create value. This explains why product and process upgrading, instead of functional and inter-sectoral upgrading, are more common in value chains of developing countries (Trienekens, 2011), where

the pool of highly skilled workers is rather limited, leading to a lack of capabilities, namely in marketing activities (Lee and Chen, 2000). As a result, many firms in developing economies remain as commodity suppliers for developed value chain partners (Trienekens, 2011).

Following the empirical work by Lee and Chen (2000) and Gereffi (1999), Kaplinsky and Morris (2002) go as far as to suggest a trajectory of upgrading, which is illustrated in Table 1. The trajectory begins with process upgrading, moving to product upgrading, then to functional upgrading and finally to chain upgrading – which corresponds to the East Asian firms paths of transition: OEA production (Original Equipment Assembling) to OEM (Original Equipment Manufacturing), then to ODM (Own Design Manufacturer) and finally to OBM (Own Brand Manufacturing). Baldwin (2012) describes the importance of each stage of the value chain by using what he calls the "smile curve", because the two ends of the chain (Product concept, design, R&D; and Sales, marketing and after sales services) are nowadays responsible for significantly higher shares of value-added than manufacturing. Baldwin's smile curve is depicted in Figure 1.

Figure 1: Smile Curve Economics



Source: Baldwin (2012)

Upgrading is thus commonly seen as a path for development, as emerging and developing economies move from cost-competitiveness to value differentiation. Therefore, it is a broad concept that is used in many social sciences (e.g., sociology,

anthropology) and within different streams in economics (trade, development, public policy). It is often empirically studied in geographical contexts of low or intermediate stages of development (some of the more recent empirical works in the field address developing or emerging economies), but it is not restricted to such contexts, as it will be seen in further detail in the following section.

Summarizing, the contributions surveyed above can be easily integrated. From seminal works on trade theory focusing on firm heterogeneity, it can be concluded that to succeed outside its domestic market, a firm has to stand out from the crowd. The self-selected firms who do export have to fill a certain demand gap, and need to be the more productive doing so. Success can be driven either by cost or quality-based competitiveness. The concept of upgrading, although emerging from a different theoretical framework (GVC literature) complements this perspective, helping to understand how firms can outperform their national counterparts and foreign competitors by adding value to their products and processes, and by acquiring new competences (e.g., R&D, design and marketing), through the development of relatively scarce resources, such as specialized knowledge and creativity.

2.3. Empirical work on upgrading: the challenge of measuring quality

Both New Trade and Global Value Chain theories have been the source of many empirical studies focusing on quality as a means to improve competitiveness. One of the main challenges at this level is to find a way to comprehensively measure overall quality, defined as any tangible or intangible attribute of a good that increases consumers' valuation of it (Hallak and Schott, 2011, p.418).

The knowledge about countries' product quality and its evolution over time is severely constrained by the scarcity of data on product quality (Hallak and Schott, 2008). Nevertheless, a growing number of studies, as those surveyed in the previous sections, have been able to circumvent such difficulties by finding different proxies for quality measurement in a wide variety of national and international data sources, as well as by gathering primary data from direct observation and interviews.

Tables 2, 3-A and 3-B below summarize some of these works, distinguishing between those which are theoretically based on firm heterogeneity trade theory (Table

2), from those which rely on the Global Value Chain theory (Tables 3-A and 3-B). Given the great number and the wide scope of the works within this last category, we have chosen to separate the latest works in the field (Table 2-A) from those who focus strictly on the wine industry, which is the focus of this work (Table 2-B).

Table 2: Summary of empirical studies focusing on quality upgrading from the New Trade Theory perspective (relationship between firm heterogeneity and trade)

Author(s)	Industry scope	Geographical scope	Data	Main data sources	Quality proxies
Fernandes and Paunov (2013)	Manufacturing	Chile	Firm unit values, Import penetration ratios, Transport costs	Chilean National Statistical Office, COMTRADE, Latin American Integration Association (ALADI)	Unit values
Iacovone and Javorcik (2012)	Manufacturing	Mexico	Production, Sales and Exports Data, Tariff Data	Mexican Institute of Statistics, Geography and Information, US MFN	Domestic Price Premium
Johnson (2012)	Manufacturing	World	Trade flow and Trade Costs Data	CEPII BACI Database, CEPII gravity dataset, Previous Reasearch	Unit values
Kugler and Verhoogen (2012)	Manufacturing	Colombia	Product level data, Trade data, Employment Data, Sector level R&D and Advertising Intensity Data	Colombian National Statistics Agency, U.S. Federal Trade Commission	Unit values, Ratio of industry-level R&D; Advertising Expenditures to Sales
Hallak and Schott (2011)	Manufacturing	World	Import Data, Trade Balance Data, Customs Data, Tariff Information, Exchange Rate Data	US Bureau of the Census, COMTRADE, US Bureau of the Census, UNCTAD, TRAINS, Economist Intelligence Unit	Unit values vs trade balances
Hallak and Sivadasan (2011)	Manufacturing	India, U.S. India and Colombia	Establishment and product-level information	India's Central Statistical Organization, US Bureau of the Census, Chilean and Colombian Manufacturing Census	ISO 9000
Khandelwal (2010)	Manufacturing	United States	Product level import data	Feenstra et al. (2002)	Unit values and market shares
Van Hove (2010)	All	European Union	Trade data	UNCTAD	Unit values,
Crozet *et al* (2009)	Wine	France	Firm-level export declarations, quality ratings	French Customs, Juhlin (2008)	Juhlin's quality ratings[1)]
Manova and Zhang (2009)	All	China	Customs Data	Chinese Customs Office	R&D and Advertising Intensity
Verhoogen (2008)	Manufacturing	Mexico	Firm Surveys	Mexican Institute of Statistics, Geography and Information	ISO 9000
Hummels and Klenow (2005)	All	World	Bilateral Import Data, Customs Data, Data on US Employment	UNCTAD, TRAINS, US Bureau of the Census, Previous Research	Quality margin
Schott (2004)	All	United States	Product level import data	US Bureau of the Census, Previous Research	Unit values

Note:[1)] Juhlin, R. (2008), *Champagne Guide* (Richard Juhlin Publishing AB) is used by Crozet *et al* (2009) to assess quality of champagne made in 284 different firms

Table 3 –A: Summary of empirical studies focusing on quality upgrading from the Global Value Chain Theory perspective

Author(s)	Industry Scope	Geographical scope	Data	Main data sources	Quality Upgrading Proxies
Chen and Funke (2013)	All	China	Physical capital, human capital and innovation indices	World Bank, National Bureau of Statistics, China Statistical Yearbooks, China Science and Technological Statistics	GFCF, expenditure on education and tertiary enrollment rates, % exports of high-tech products, number of Chinese patent applications
Goto and Endo (2013)	Garments	Thailand	Trade and labour sectorial data	COMTRADE, Thailand Textile Institute	Relative Performance Index, Relative Export Import Ratio, Unit values, Unit wages
Kadarusman and Nadvi (2013)	Electronics and Garments	Indonesia	Firm-specific information on upgrading strategies	Secondary evidence and primary interviews	Description of upgrading processes
Poncet and Starosta de Waldemar (2013)	All	China	Data on product and city complexity	BACI dataset, China Data Online (University of Michigan)	Product complexity
Rossi (2013)	Garments	Morocco	Data collected from direct interviews	Primary interviews	Managers' assessment of upgrading
Pipkin (2011)	Garments	Guatemala and Colombia	Data collected from direct interviews	Primary interviews	Description of upgrading processes
Devadason (2009)	Electrical and Electronic Components	China and Malaysia	Trade data	COMTRADE	Relative prices of exports to imports

Table 3 - B: Summary of empirical studies focusing on quality upgrading in the wine industry from the Global Value Chain Theory perspective

Author(s)	Industry Scope	Geographical scope	Data	Main data sources	Quality Upgrading Proxies
Gwynne (2012)	Wine	Chile and New Zealand	Data in commodity chain relationships	Primary interviews	Description of upgrading processes
Ponte (2009)	Wine	South Africa	Data on wine quality perceptions	Primary interviews	Quality conventions
Ponte and Ewert (2009)	Wine	South Africa	Wine industry data	Previous research, primary interviews, SAWIS	Unit prices, varietal composition, packaging forms, alcohol levels, origin certification, quality certifications.
McDermott (2007)	Wine	Argentina	Wine industry data for two provinces	National Statistical Office of Argentina, Instituto Nacional de Vitivinicultura	Harvest composition by quality segments
Ponte (2007)	Wine	South Africa	Wine industry data	Primary interviews, SAWIS	Unit prices, varietal composition, packaging forms, alcohol levels, origin certification, quality certifications.

As seen from the summary tables above, unit values (sometimes simply referred to as *prices*) are the most frequently used measure of quality, being used both in studies theoretically grounded on the New Trade Theory (cf. Fernandes and Paunov, 2013; Johnson, 2012; Kugler and Verhoogen, 2012; Khandelwal, 2010; Van Hove, 2010; Hallak and Schott, 2008, Schott, 2004), and in studies based on the Global Value Chain theory (e.g., Goto and Endo, 2013; Devadason, 2009; Ponte and Ewert, 2009; Ponte, 2007). Being a measure of nominal value relative to physical volume, they signal overall quality (Aiginger, 2000), since an increase in value is likely to happen when there is an improvement of product attributes and characteristics (*product upgrading*), a refinement in its production process (*process upgrading*), and/or the addition of new functions, such as better design or marketing (*functional upgrading*). In fact, although there is a clear theoretical categorization of the different types of upgrading, the empirical validation of upgrading is often made from an aggregate perspective, which combines several types of upgrading. The main strength of unit values as an indicator of quality is precisely its comprehensiveness, as it includes most of the components which add value. However, it has also some limitations, the most important one being that it can signal costs, rather than quality (Khandelwal, 2009; Hallak and Schott, 2008; Aiginger, 2000). That usually happens when the consumer evaluation of the product is mostly based on the price of its inputs (for example, oil), instead of its variety and specific characteristics.

In order to overcome this deficiency, a number of methods have been developed in the literature. Some methods use aggregate trade balances, assuming that if consumers care about price relative to quality, among countries with identical export prices, the country with the higher trade balance is revealed to possess higher product quality (Hallak and Schott, 2008; Aiginger, 2000). Other methods use market shares: conditional on price, imports with higher market shares are assigned higher quality (Khandelwal, 2010). Trade prices are also used by Devadason (2009), who computes the relative unit values of exports to imports of a particular product. If these relative unit values are above unity, it can be inferred that the country to which they refer exports higher quality components, of which it imports lower quality varieties, and vice versa.

In many cases, the interpretation of unit values is performed in relative terms. Iacovone and Javorcik (2012), for example, assess quality in the Mexican manufacturing sector, computing the domestic price premium, i.e. the difference

between the log unit values obtained by product *p* sold in Mexico by producer *i* at time *t* and the average unit value obtained by all producers selling product *p* in Mexico at time *t*. Hummels and Klenow (2005) in turn use the concept of *quality margin*, which is computed by relating a country's GDP with the quantity and price (unit values) of exports: if large exporters systematically sell high quantities at high prices, this is consistent with the interpretation that these exporters produce high-quality goods. Goto and Endo (2013), in their assessment of quality upgrading in the Thai garment industry, also complement the temporal analysis of unit values, with the computation of two indices based on Balassa's (1965) well-known Revealed Comparative Advantage indicator: the *Relative Performance Index*, which compares the export share of the Thai garment industry with the world's garment industry's aggregate export share, and the *Relative Export Import Ratio*, i.e., the ratio between the coverage ratio for the Thai garment industry and the coverage ratio for worldwide garment industry.

In a different line of research, Poncet and Starosta de Waldemar (2013) use product complexity to assess upgrading, assuming that the more complex a country's exports are, the more *upgraded* its production is. The complexity indicator is based on Hidalgo and Hausmann's (2009) computations on the ubiquity and the diversity of exports. The reasoning behind this method is that a complex product is one that requires several and/or exclusive capabilities. The diversity of a country increases with the number of capabilities it has, whereas the ubiquity of a country's products is a decreasing function of the number of capabilities available in that country.

R&D and advertising expenditures have also been used to proxy quality, either combined with unit values (Kugler and Verhoogen, 2012), or considered independently (Manova and Zhang, 2009). Chen and Funke (2013) use R&D and education indicators, along with gross fixed capital formation, to proxy quality and innovation in China. They also include data on education expenditure, enrollment rates, exports rates of high-tech products, and the number of registered patents. Hallak and Sivadasan (2011) and Verhoogen (2008), in turn, use ISO 9000 certifications to proxy quality in the manufacturing sector.

Crozet *et al* (2009) have published the only study stemming from the New Trade Thoery that focuses on the wine industry. The authors' goal was to verify Melitz's (2003) conclusions using data from the French champagne business, the measurement of quality was made by using a quality rating of champagne producers made by Richard

Juhlin, one of the most influential champagne experts worldwide. This ranking is included in a guide where Juhlin provides two scores for the overall quality of the champagnes made by 487 different producers. The author then matches these quality assessments with firm-level export data to estimate the parameters of the Melitz model.

As seen from Tables 3-A and 3-B, the empirical work on upgrading based on the Global Value Chain perspective is often made using primary information, gathered by firm-level interviews, rather than data from statistical agencies (e.g., Kadarusman and Nadvi, 2013; Rossi, 2013; Gwynne, 2012; Pipkin, 2011; Ponte, 2009; Ponte and Ewert, 2009; Ponte, 2007). Relative to secondary data, the use of interviews has the advantage of allowing for the descriptive elaboration of an industry's or country's upgrading process by its own actors. In the case of Ponte (2009), a number of interviews were made with South African wine operators and subsidiaries of UK importers and marketers based in South Africa. Those interviews allowed to gather evidence on the perceptions of UK buyers relative to the quality of South African wine, focusing on six quality 'conventions' (i.e. perspectives from which quality can be evaluated) that are specific of the wine industry. Based on the comprehensiveness of this bundle of conventions, Ponte states that the wine industry has the most complex and sophisticated quality infrastructure in the agricultural-food sector. In fact, along with price, the wine industry has a number of specificities that allow for the use of complementary notions of quality. The six quality conventions identified by Ponte (2009) are as follows: *industrial* (quality is assessed through laboratory tests and the codification of procedures); *market* (quality is assessed through price); *civic* (quality assessed through labels and certifications of food safety and environmental and social impact); *opinion* (quality is assessed through endorsement by wine writers and publications); *domestic* (quality is assessed through varietal composition, *terroir*, indication of geographic origin); and *inspiration* (quality is assessed through the uniqueness, the cult of the winemaker or the property). This bundle of conventions is exclusive for wine, constituting therefore a specific empirical tool set for the analysis of this sector. Crossing Ponte's classification with the methods used in the works surveyed above, it can be seen that most studies use quality variables related with the market convention (export and import unit values). R&D expenditure, which is also a commonly used measure of quality can be considered as being part of the industrial convention, as its impact is mainly reflected in the industrial upgrading process. ISO 9000 certifications

can be included within the civic convention, since general derivatives of it, for instance the ISO 22000, are standards that certify food safety.

Along with the computation of unit values (the traditional market convention approach), Ponte and Ewert (2009) use primary data from field interviews and of sector-specific statistics on product, process and functional upgrading provided by the South African Wine Industry Information & Systems (SAWIS). The authors use SAWIS to retrieve information about the red/white composition of South African wine production (red varieties are considered to be more valuable due to the increasing international demand for reds); proportion of bottled exports *versus* bulk exports (bottled exports have more value added); proportion of natural *versus* rebate/distilling wine production; proportion of noble varieties,[4] alcohol levels (a higher alcohol level may indicate the existence of more powerful yeasts and better vine material); and the proportion of wines certified under Wine of Origin scheme. Data on process upgrading is mainly obtained from producer-level interviews and previous research on the South African wine industry. These interviews address topics such as changes in managerial systems, viticultural and winemaking practices and labor skills, certifications, marketing and branding. They also identify general trends on functional upgrading, concluding, for instance, that cellars and producer-wholesalers are moving away from grape-growing and starting to engage in other functions such as marketing and branding.

Wine has been identified as an industry that, unlike manufacturing (which is the focus of most empirical studies), is able to provide researchers with significant data on quality, from a variety of perspectives (cf. Ponte's conventions). Crozet *et al* (2009), for instance, have chosen to study champagne exactly because they found that investigation of the quality interpretation of the Melitz's (2003) model had been limited by the lack of direct data on quality, and they saw champagne ratings as an opportunity to overcome this barrier. Therefore, when analyzing the wine industry, we need to take these valuable, sector-specific quality proxies into account.

[4] McDermott (2009) also uses production composition by quality segments to measure quality for Argentinian wine

3. Portuguese wine production and trade: an overview

3.1. Wine production in Portugal: general traits

Viticulture takes place in every Portuguese region. The country is located between 37º and 42º northern latitude and benefits from a dry-summer subtropical/Mediterranean climate (Csa and Csb, respectively, in the Koppen climate classification),[5] with many regional variations which have a significant impact on viticulture. Climate diversity, along with a history of viticulture that dates back to the Phoenicians, allows the production of a great variety of grapes and characters. The total vineyard area (239 thousand ha)[6] comprises 341 different varieties, most of them native, which allows Portugal to produce unique wines consumed by niches, an important distinctive factor in a world dominated by plantings of native French varieties such as Chardonnay, Sauvignon Blanc, Merlot and Cabernet Sauvignon (Caldas and Rebelo, 2013).

Therefore, although the country has only about 92 000km^2 of land, it has 12 continental wine regions and two other in the archipelagos of Madeira and Azores, as pictured in Figure 2 below. According to Climaco *et al* (2012), the continental regions can be grouped in two broad categories: those which are influenced by maritime winds (*Vinhos Verdes, Bairrada, Lisboa e Península de Setúbal*), and those that benefit from generally warmer regions (*Douro, Trás-os-Montes, Dão, Beira Interior, Ribatejo, Alentejo* and *Algarve*).

Home of one of the world's best fortified wines, the Port, the Douro region is also classified as UNESCO World Heritage since 2001 for its outstanding landscape, moulded by nearly two thousand years of winemaking. Portugal's image in the world of wine trade and consumption has been historically associated with the production of Port, despite the country's predominance in the production of unfortified wines (also known as *table wines*). There has been a recent effort to promote Portuguese table wines

[5] Köppen's classification is based on a subdivision of terrestrial climates into five major types, which are represented by the capital letters A, B, C, D, and E. The mid-latitude C and D climates are given a second letter, f (no dry season), w (winter dry), or s (summer dry), and a third symbol (a, b, c, or d [the last subclass exists only for D climates]), indicating the warmth of the summer or the coldness of the winter.

[6] See Table 15 in the Appendix.

in international markets, which has been recognised by world known wine critics such as Matt Kramer, who is a regular contributor of the *Wine Spectator* magazine, one of the most influential publications in the field. In the article *"Is Portugal the Most Exciting Wine Place on the Planet Today?",* he wrote that "in the past 15 years or so, about half of the wine production from the larger Douro zone — an area that extends beyond the boundaries designated for Port production — is now table wine. That's really incredible. I know of no other historically significant wine zone that has transformed to anywhere near that degree." (Kramer, 2014, para.13).

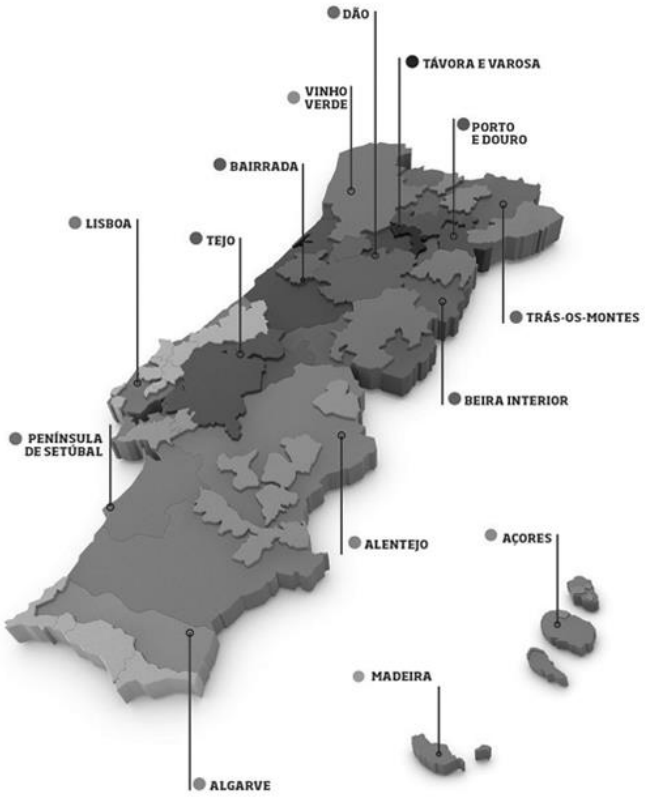


Figure 2: Portuguese Wine Regions

Source: Wines of Portugal (www.winesofportugal.info)

3.2. Trade in the pre-industrialization period: wine as the main export

The outstanding climate and geographical conditions for the production of wine translated into international trade flows since early times. In fact, few trades can be said to be as old as wine. The first historical records of wine production and trade in the Iberian Peninsula date back to the years of the Roman Conquer (1st and 2nd century B.C.), although most scholars accept that, in southern areas, wine production existed already in pre-Roman times (Fabião, 1998). Vines may have been planted in western Iberia by the Tartesians as early as 2000 BC, and the activity of winemaking is believed to have been introduced by the Phoenicians (Matthews *et al.*, 2004).

The spread of the wine business is, however, deeply linked with the development of overseas trade, namely through the creation of economic ties with England, which started to take place as early as the 14th century: the treaty of Windsor, considered the world's oldest diplomatic alliance, was signed in 1386 and established close economic links between the two countries. The English merchants demonstrated their interest in trading wine from Viana do Castelo's port in the north west of the country, in the region of Minho, where a cheap, low-quality wine was produced (Uwin, 1991). In the late 17th century, Britain imposed a series of embargoes and high tariffs on French goods, including wines, due to an ongoing war between the two countries, which ultimately caused wine imports from Spain and Portugal to rise. This opened the way for the Methuen Treaty, a milestone agreement in the history of Portuguese trade, signed in 1703. Officially designated as the Anglo-Portuguese Commercial Treaty of 1703, it stated that Portugal should remove all prohibitions on English cloth and England would impose at least one third less duty on Portuguese wines than on French wines (Ludington, 2013). Although the treaty promoted trade between the two countries, it has been largely regarded as a negative deal for Portugal as exporting an agricultural product and importing a manufactured one was one of the factors hindering the industrialization process in Portugal. Overall, the impact of the agreement on the wine trade seems to have been less satisfactory than in the cloth trade (Cardoso *et al*, 2003).

Around this time, as the commercial ties between Portugal and England were strengthening, English merchants started looking for a type of wine that would better suit the taste of the English consumer. They found it in the hillsides of the upper Douro Valley, a hot and arid inland region behind the Marão mountains. However, the

mountainous terrain and the long distance made it difficult to transport the wine all the way up north to Viana, and so it had to be carried down the river Douro to the city of Porto and then shipped to England under the name of *Vinho do Porto* (Oporto wine), and known in English as 'Port' (Taylor's, n.d.).

The 18th century also marked the first period of state intervention in the sector by the hand of the Marquis the Pombal, the Portuguese prime minister better known for his work in the restoration of Lisbon after the catastrophic earthquake that destroyed most of the city in 1755. To avoid production fraud and the devaluation of exports, he established total state control over wine trade by creating a monopolistic arrangement dominated by the state-owned company *Companhia Geral de Agricultura das Vinhas do Alto Douro*, which imposed fixed prices, demarcated the Port wine production region in the Douro Valley and established several categories of wine according to their quality (Barreto, 1988). The finest wines, known as *vinhos de feitoria*, were allowed to be exported at a higher price, whilst the lower quality wines, called *vinhos de ramo*, were restricted to the domestic market (Taylor's, n.d.). These measures, whose goal was to add value to Portuguese wine, are a remarkable example of how the definition of quality standards and classifications can have an impact in export unit values. Although a result of government regulation, the separation of destination markets according to quality (high quality wines were able to enter export markets, whilst low quality wines were restricted to the domestic market) was a response to a challenge that is still a reality today: upgrading quality as a means to differentiate and avoid more aggressive price-based competition in international markets.

With a visionary mind, the Marquis was a precursor of the modern concept behind the designation of origin classifications, which are still used to differentiate prices in international markets. The Douro Demarcated Wine region survived the progressive liberalisation of trade, which started between the end of the 19th century and the beginning of the 20th. The first years of free production and trade brought export growth, mainly through the expansion to new markets. Demand was growing, especially from France, partially due to the fact that French vines had been severely affected by phylloxera (Lains, 2003a), a plague of mites which fed on the vines' roots, brought to Europe by the import of North American vines which carried the plague. Portuguese vines, especially in the Douro Valley, were also affected by the disease, although at a

smaller scale. Several indigenous grape varieties were loss due to the phylloxera scourge.

By the end of the 19th century, wine represented about one third of all exports, and port wine specifically accounted for one fourth of the total, but it was exclusively sold in bulk, which lowered its value (Afonso and Aguiar, 2004; Lains, 2003b).

3.3. 20th century and afterwards: protectionism vs. the common market

Between 1926 and 1974, Portugal was ruled by a conservative dictatorship, known as *Estado Novo* ("New State"). This regime was responsible for various decades of protectionist policy characterised by fixed prices, as well as limited competition and access to international markets (Barreto, 1988). Agricultural production was organized into corporations with strict production quotas. The end of the dictatorial regime in 1974 and the country's entry into the European Economic Community (EEC) in 1986, after a period of political instability, have opened the way for Portuguese winemakers to benefit from European funds to invest in their plantations and to access international markets. After 1986, there was also a high number of producers engaging in vertical integration strategies (Muhr and Rebelo, 2011), producing and bottling their wines under their own labels, rather than selling the grapes to companies and co-operatives. Due to their dimension, the international market entry was more difficult, and therefore their market strategy was above all based on differentiation, with product promotion being made through marketing events, press releases and interactions with wine experts (Caldas and Rebelo, 2013).

EEC membership also meant that winemaking was to be bound to a set of rules within the framework of the Common Market Organization (CMO). These rules, included in the Council Regulation no. 491/2009, cover a vast array of topics such as planting and replanting rights, grubbing up schemes and production rules, as well as wine sector specific support programmes for economic activities (e.g., promotion on third-country markets, vineyard restructuring and conversion, green harvesting and investment on new products, processes and technologies), which can be broadly included in the aforementioned notion of *upgrading*. It also defines a unified

classification scheme of protected designation of origin and geographical indications. According to article 118b, " 'designation of origin' means the name of a region, a specific place or, in exceptional cases, a country used to describe a product (…) that complies with the following requirements: (i) its quality and characteristics are essentially or exclusively due to a particular geographical environment with its inherent natural and human factors; (ii) the grapes from which it is produced come exclusively from this geographical area; (iii) its production takes place in this geographical area; and (iv) it is obtained from vine varieties belonging to Vitis vinifera". " 'Geographical indication', on the other hand, means an indication referring to a region, a specific place or, in exceptional cases, a country, used to describe a product (…) which complies with the following requirements: (i) it possesses a specific quality, reputation or other characteristics attributable to that geographical origin; (ii) at least 85% of the grapes used for its production come exclusively from this geographical area; (iii) its production takes place in this geographical area; and (iv) it is obtained from vine varieties belonging to Vitis vinifera or a cross between the Vitis vinifera species and other species of the genus Vitis".

The classifications imposed by the CMO constitute an important step towards the creation of value in international markets. In the Portuguese case, wines that qualify as part of the protected designation of origin scheme can be labelled either as DOP (*Denominação de Origem Protegida* – i.e. Protected Designation of Origin) or DOC (*Denominação de Origem Controlada* – i.e. Controlled Designation of Origin). As for Protected Geographical Indication, Portuguese wines can be labelled either IG (*Indicação Geográfica* – i.e. Geographical Indication), IGP (*Indicação Geográfica Protegida* – i.e. Protected Geographical Indication), or even *Vinho Regional* (Regional wine). Wine not fitting into the above categories is simply known as 'Vinho' (Wine) or 'Vinho de mesa' (Table wine).

Official records of wine exports and imports, in its several varieties have been compiled by the Portuguese Statistics Office (*Instituto Nacional de Estatística* - INE) since 1939 and published in *Estatísticas Agrícolas* ("Agricultural Statistics"). Based on these data, Figure 2 below presents the evolution of the import and export flows of Portuguese wine for a period of 73 years, between 1939 and 2011. The identification of the wine category by the source varied slightly during the period considered, due to

changes in the classification of goods. Data presented in Figure 3 refers to the categories identified as follows:

- From 1939 to 1964: Chapter II (food products), point a (of vegetal origin), number 6 (beverages and beverage products), line 'Wines';
- From 1965 to 1987: Code 22.05 (Wine and grape must arrested by the addition of alcohol);
- In 1988: Code 22.03 (*Espumantes e espumosos* (sparkling wines); *Vinho verde*, *Vinho do Dão*, *Vinho da Bairrada*, *Vinho do Douro* (regional varieties); *Outros vinhos* (other wines); *Vinho do Porto* (Port wine); *Vinho da Madeira* (Madeira wine); *vinhos licorosos* (liqueur wines);
- From 1989 to 2011: Code 22.04 ("Wine of fresh grapes, must")

Imports and exports' quantities are presented in tonnes (t).[7]

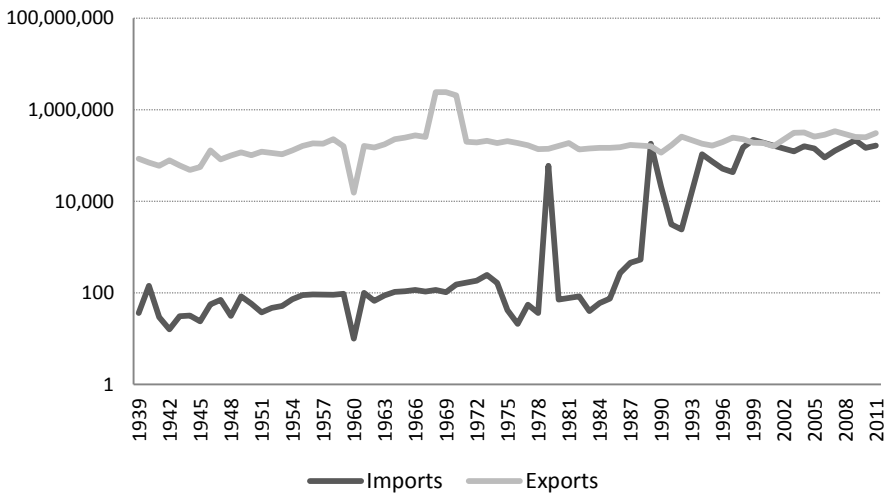


Figure 3: Evolution of wine imports and exports (tonnes), Portugal

Source: Estatísticas Agrícolas and author's calculations, INE.

[7] Traded volumes were reported in tonnes (t) from 1968 to 1998. From 1939 to 1966, they were reported in metric hundredweight (*quintal métrico* [q]), which equals 100 kilograms. Therefore, we converted these values to tonnes by simply diving them by 10. In the year of 1967, exported and imported quantities were reported in hectoliters. For conversion purposes, we considered 1 hectolitre (100 litres) to be equal to 100 kilograms and therefore divided those values by 10 to obtain tonnes.

The signing of the Free Trade Agreement with the EEC in 1972, followed by EEC membership in 1986 were some of the main factors that contributed to an overall increase in the degree of openness of the Portuguese economy (exports and imports of goods over GDP) from 17% in 1970 to more than 30% in 2000 (Afonso and Aguiar, 2004). The increasing liberalization of trade had a clear impact also in wine, particularly in imported volumes, which show a significant increase since 1986: imports increased from 271.9 tonnes in 1986 to 1 636 088.4 tonnes in 2011.[8]

From 1999 onwards there has been a stabilization of imported quantities, which reach values similar to exports. Export volumes have been relatively stable, suffering a mild increase in 1999 and stabilizing afterwards. Therefore, the increase of openness that took place in the second half of the 20th century has strongly influenced imports volume – it has increased significantly due to the removal of import barriers that existed since the 30s (Rosas, 1991), but did not have such an impact in exports.

Although export volumes do not show a decreasing trend since 1939, the share of wine in the value of total exports kept decreasing (c.f. Figure 4). Following the country's industrialization, wine progressively lost ground in favour of more industrialised consumer goods, with higher value added. By the end of the 20th century, footwear and textiles represented one fourth of total exports, a share similar to that of port wine a century before (Afonso and Aguiar, 2004).

[8] INE's data reveal abnormally high imported quantities in 1979 and 1989. Relying on explanatory notes included in the *Estatísticas Agrícolas* (1978), it can be seen that 1978 was a year of low production – less 3% than in the previous harvest and less than 30% the average of the previous ten years. While this might have had an influence on the increase of imported volumes, import figures may also reflect possible fragilities in data collection for this year. As for 1989, the increase might also be due to a sudden break in production which went from more than 10.7 million hectoliters in 1987 to 3.6 million hectoliters in 1988.

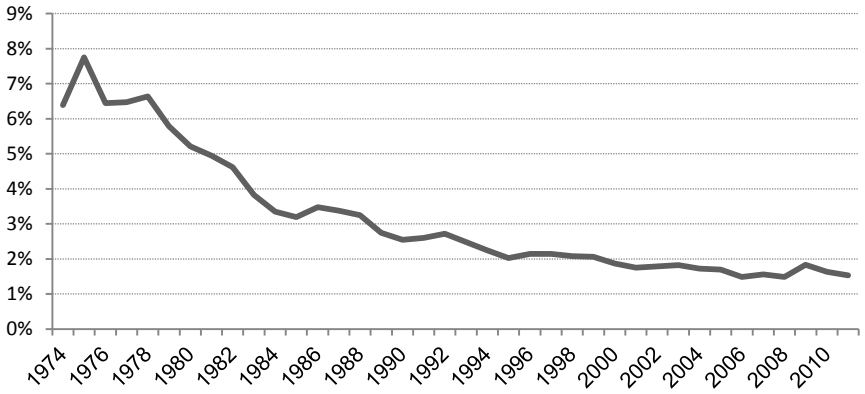


Figure 4: Evolution of the share of wine exports over total exports (value), Portugal,

Source: INE, Estatísticas Agrícolas

Although Portugal has been a net exporter of wine, the increasing trade liberalization has also led to the decline of the coverage rate of imports by exports during the period under analysis, as depicted in Figure 5.

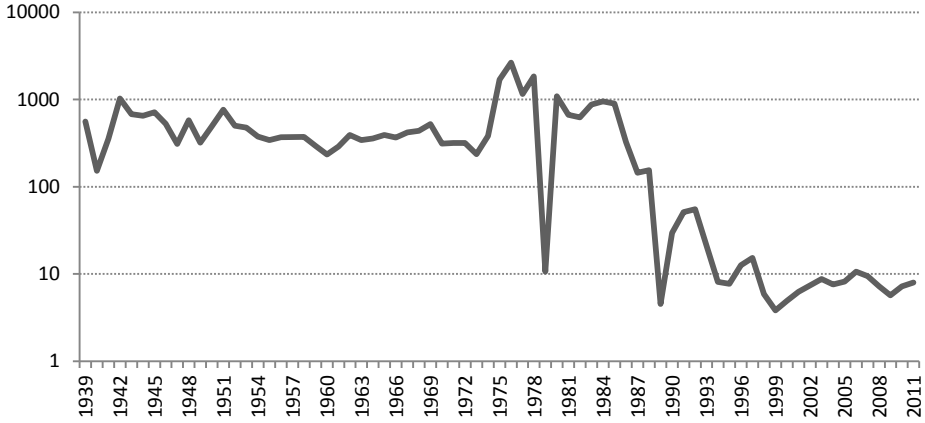


Figure 5: Coverage rate of imports by exports for wine (value) Portugal

Source: Estatísticas Agrícolas, INE;

Although with a decreasing trend, Portugal's specialization and competitive position in the sector is still quite strong, with the coverage rate stabilizing near 10 in the period between 1994 and 2011. The sector's maintains a strong revealed comparative advantage (Figure 6), as computed by the well-known Balassa index (Balassa, 1965).

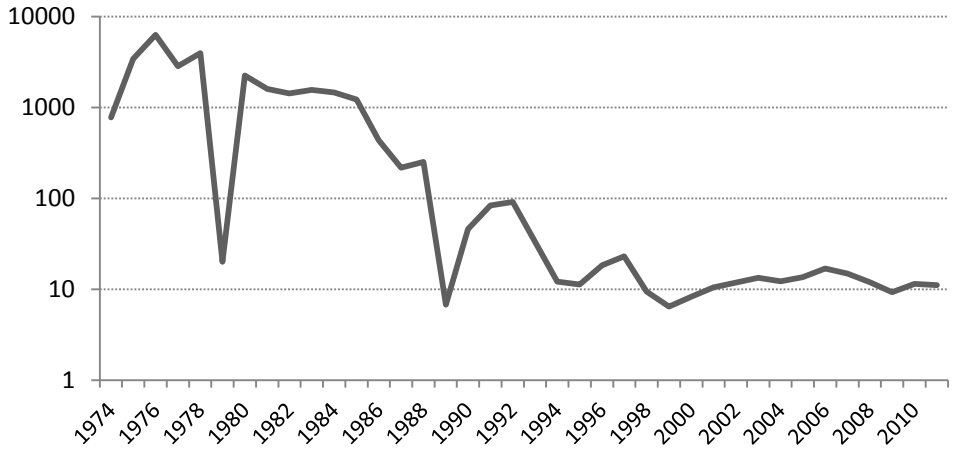


Figure 6: Revealed Comparative Advantage of the Wine sector, Portugal

Source: Estatísticas Agrícolas, INE; INE

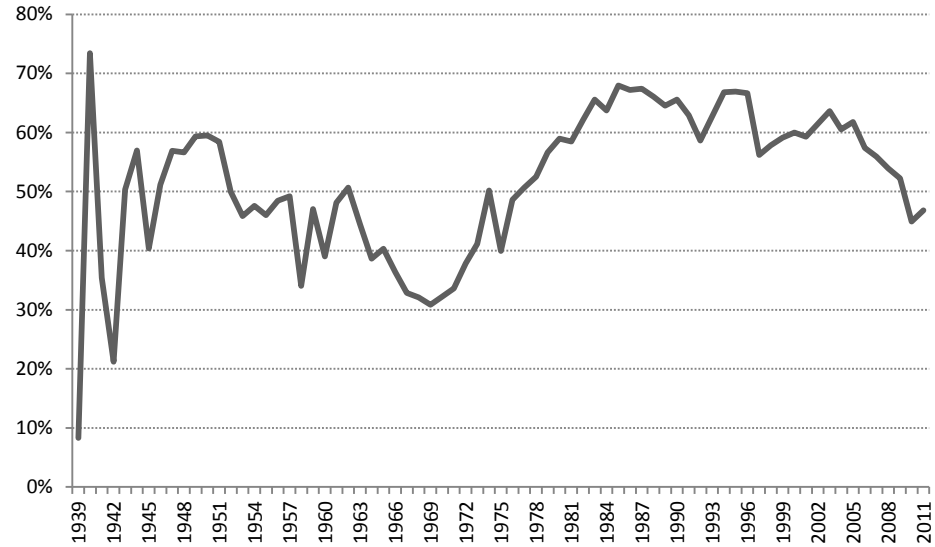


Figure 7: Evolution of the share of Port wine exports in total wine exports (value), Portugal

Source: Estatísticas Agrícolas, INE

Figure 7 presents the evolution of Port wine in total wine exports. Between 1943 and 2011, Port wine represented a substantial part of the value of all wine exports, with an average share of 30 to 70%. After Portugal's entry in the EEC membership the share of Port exports has been consistently above 50%, with the exception of the last two years. From this evidence, and the fact that it is a product that is exclusively produced in Portugal, it can be seen that Port wine is indeed crucial in the definition of the sector's competitive advantage.

3.4. Recent trends: the Portuguese wine production from an international perspective

In the first years of the 21st century, the majority of Portuguese wine exports stayed within European Union borders. Nevertheless, data from the Portuguese Statistical Office (INE),[9] reveals that the importance of the EU countries as destination markets has been decreasing in relation to Extra-EU destinations, which reflects the growing prominence of non-EU countries with which Portugal has historical commercial ties, such as Brazil and Angola (Figure 8). EU countries were the destination of more than 70% of Portuguese wine exports, but the gap has narrowed between 2000 and 2013, with the relative importance of extra EU trade growing more than 15 p.p..

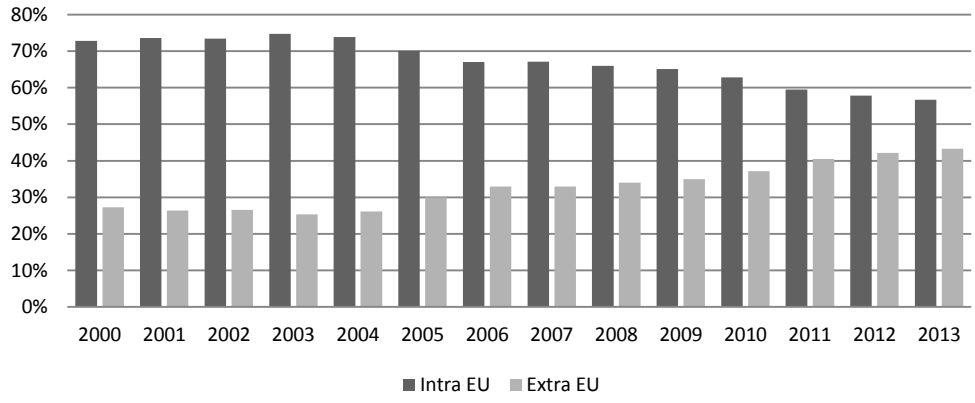


Figure 8: Portuguese wine export destinations, % of the exported value

Source: Estatísticas do Comércio Internacional de bens, INE

Figure 9 presents the current top 10 destinations for Portuguese wine exports and the evolution of their respective shares of exported value.

[9] Data regard EU's Combined Nomenclature 8 category 2204: Wine of fresh grapes, including fortified wines; grape must other than that of heading 2009 (fruit juices)

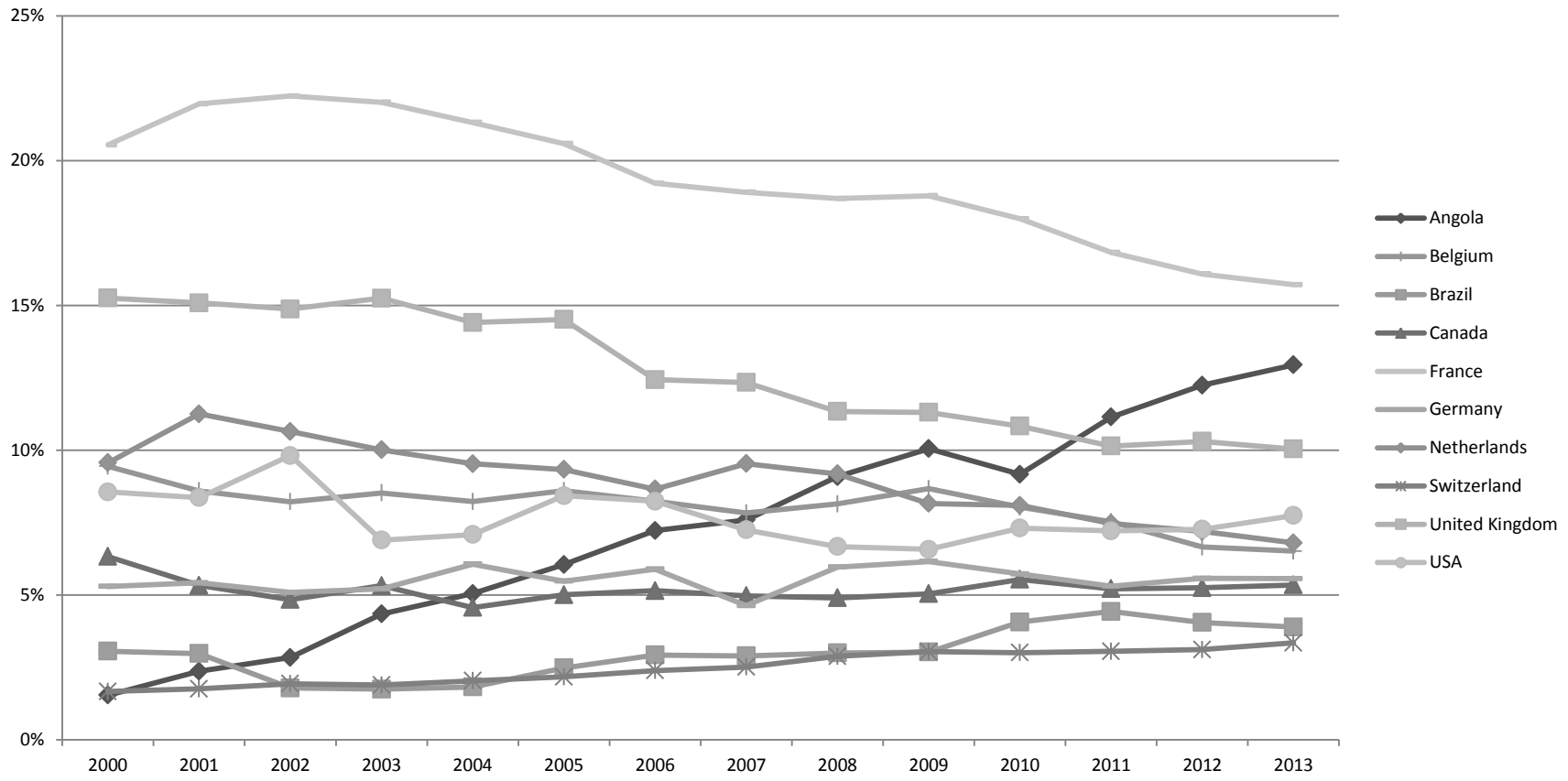


Figure 9: Main destinations for Portuguese wine exports, % of the exported value

Source: Estatísticas do Comércio Internacional de bens, INE

France stands out as the main export destination for Portuguese wine, a position that has weakened since 2000, with the share of the country decreasing from more than 20% in the first 5 years to 15.7% in 2013. France's position as the destination market is not oblivious to the fact that the country is the world's largest wine consumer, with around 30269 thousand hectolitres consumed in 2013 (OIV, 2013).

In 2011, Angola surpassed the United Kingdom as the second main destination for Portuguese wine exports. The relative importance of Angola as a destination market has grown dramatically in the period under analysis: in 2000 it was the destination for only 1.7% of Portuguese wine exports (it was the 14th destination market), reaching 12.9% in 2013. This impressive growth happens despite of the trade barriers that still exist between the two countries, namely custom tariffs and logistical difficulties. Due to its cultural ties with Portugal and the presence of a significant Portuguese immigrant community, Angola has borrowed the Portuguese taste for wine, being a consumer without their own national wine production, which makes it a particularly appealing destination market. Angola's growth as a destination market is in fact the main cause of the growth of Extra EU destinations. The importance of Brazil has grown only slightly, with the country being the destination for 3.9% of the exported value in 2013 (9th destination market). This is mainly due to the high tariff costs applied to imported wines, together with significant instability concerning fiscal policy.

Switzerland, although only the 10th most important destination for the most part of the period, has doubled its share as an export destination, going from 1.7% in 2000 to 3.3% in 2013. The North American destinations, Canada and the United States, do not register significant growth, as Canada (8th destination market in 2013) kept its share stable and the United States' share actually decreased slightly. However, the United States have moved from 5th to 4th main importer, mainly due to the decrease of relative importance of the Netherlands and Belgium, which fell from the 3rd and 4th positions to 5th and 6th (respectively).

Portuguese wine exporters seem to be willing to diversify their range of destination markets by expanding to "new consumers" such as Angola. However, this poses a challenge for distribution both in terms of cost and logistics, and it may also pose cultural impediments in the case of countries such as Russia and China, for instance, whose wine consumptions is growing steadily (OIV, 2013). The fact that wine consumptions is deeply rooted in cultural habits makes it more difficult to expand to

new destinations, as it requires a long time to "educate" consumers on how enjoy and perceive the beverage's quality.

Countries outside of Europe are starting to gain importance not only as destination markets, but also as production centres. Known as the "New World" (NW), producers from locations outside of the traditional wine-growing areas of Europe are increasingly more relevant in the international wine market. While the first years of the 21st century were marked by a decrease in wine production from Old World (OW) countries, the trend in NW countries was the opposite.

France, Italy and Spain all showed a reduction of more than 20% each between 2000 and 2012 (OIV, 2013); production also decreased in Portugal, although at a lower rate (about 8% between 2000 and 2012). In contrast, production grew in most New World (NW) countries. In Chile, for instance, wine production grew about 88% in the same period, with the country being already the 7th largest producer worldwide in 2012. However, growth in NW countries was not enough to compensate for the decrease in major European producers, and therefore worldwide production fell about 10%.

The NW countries were also the main contributors for an overall growth of 8% in wine consumption during the same period, with growth rates of 121% in Russia, 67% in China and 62% in Canada (OIV, 2013). NW supply and consumption increases are perhaps the most important features affecting the wine industry over the past years. This industry has become largely more competitive as important national players from NW countries seek to position themselves as global wine producers and exporters (Remaud and Courdec, 2006).

The relative importance of NW countries in world wine exports has also been growing. Figures 10 and 11 show the evolution of the shares of wine exports from NW and OW main producers, respectively, in relation to total exports. [10]

While OW countries are still the main exporters (Figure 11), with Italy and Spain accounting for almost 60% of all world wine exports in 2012 (Portugal was the origin of 4.3% of world wine exports in the same year, a higher share than that of Greece and Romania), NW countries are progressively gaining ground in international trade (Figure 10). Australia, for instance, went from 2.8% of world exports in 1992 to 12.4% in 2012,

[10] Computations made using product category 1121 (wine of fresh grapes) from COMTRADE.

an impressive growth rate. Similar patterns are also visible in the cases of Chile, USA, South Africa and Argentina.

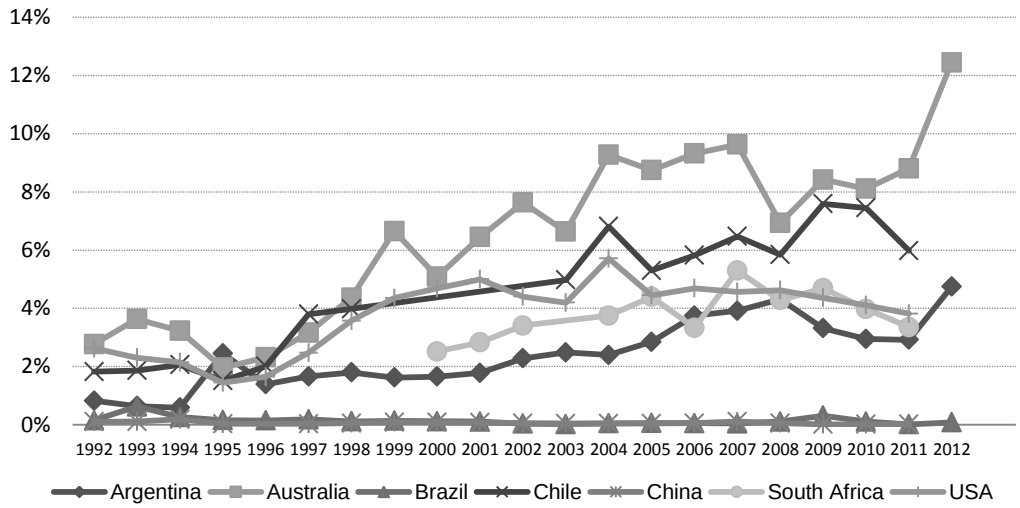


Figure 10: Evolution of NW countries share in world wine exports (volume)

Source: COMTRADE

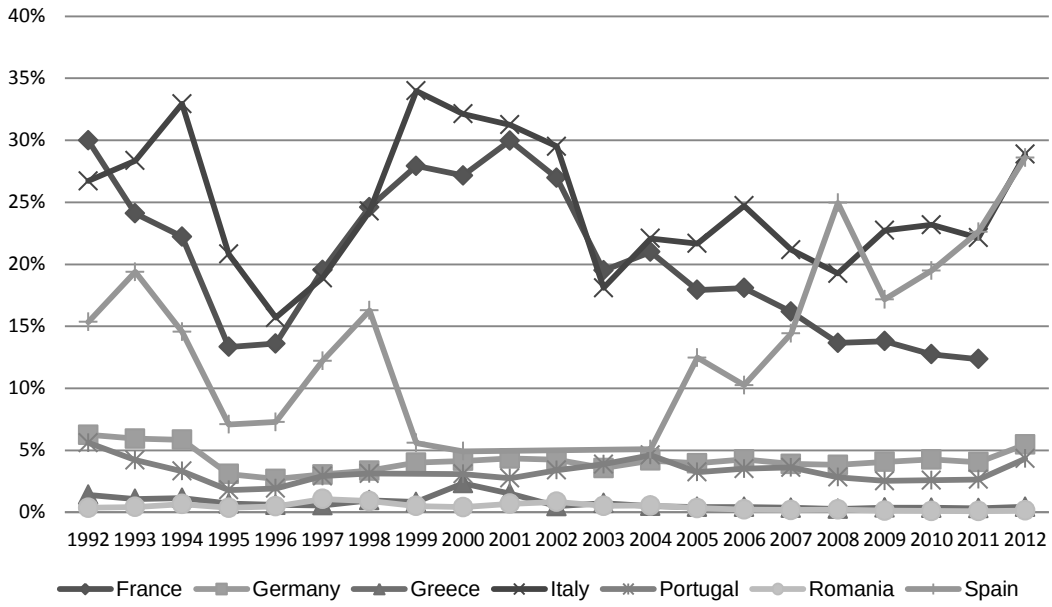


Figure 11: Evolution of OW countries' share in world wine exports (volume)

Source: COMTRADE

OW countries do not reveal a growth trend, however, with the notable exception of Spain in the more recent years. French wine exports have been losing ground since

2002. Portugal, on the other hand, has shown relative stability over time – the Portuguese share in world wine exports fluctuated around 2% (1995) and 6% (1992), with no clear signs of either an increasing or decreasing trend over time.

In 2008, the EU published an amendment which introduced a new reform to the wine CMO. At the origin of the new regulation (Council Regulation (EC) No 479/2008), it is the understanding that not all the instruments included in previous regulations were able to effectively make wine markets more sustainable and competitive: "*the market mechanism measures have often proved mediocre in terms of cost effectiveness to the extent that they have encouraged structural surpluses without requiring structural improvements*" (p. 148/2). Therefore, a set of changes were introduced with the goal of increasing competitiveness of European wine producers as well as "*strengthening the reputation of Community quality wine as the best in the world*" (p. 148/3). To this purpose, financing should be strictly aimed at strengthening competitive structures through investment in fields such as marketing and promotion in third countries (i.e., *functional upgrading*) and restructuring or conversion of plantings (i.e., *product/process upgrading*).

With vaster and stronger competition from NW winemakers, there seems to be a generalized acknowledgment of OW countries (and specifically of European policymakers) of the need to invest in the creation of value through various types of upgrading.

The Portuguese case, analyzed from an historical standpoint, shows that quality (or at least the perception of it), the diversity of production and the unique features of Portuguese wine can add significant value and become an asset in a hypercompetitive market. However, to understand to what extent Portuguese wine exports' have been influenced by quality and/or output quantity, a rigorous account of quality trends and their relationship with exports has to be made. This constitutes the main purpose of the following sections.

4. Assessing wine quality: the Portuguese case

4.1. Quality dimensions under assessment

A specific advantage of assessing quality in the wine sector is that a number of criteria may be used, besides price. A comprehensive account of the diversity of factors that may be included in such an assessment is presented by Ponte (2009). Focusing on the study of value chain upgrading in the wine industry, the author provides "an expanded framework of quality conventions" (Ponte, 2009) which considers six different perspectives from which wine quality can be evaluated. One of these conventions is, in fact, price (the so-called *market* convention) – however, when price alone cannot evaluate quality, economic actors adopt other conventions to solve uncertainty about quality (cf. Eymard-Duvernay, 1989). To be more accurately aware of a product's quality standards, actors may rely on aspects such as technical improvements in industrial processes (*industrial* convention), the existence of certifications that evaluate the impact of the product upon society, such as food safety certifications (*civic* convention) and also the authenticity of product which is evaluated through the attribution of geographical indication schemes or even, in the particular case of wine, grape variety and *terroir* (known as the *domestic* convention). Ponte (2009), elaborating on the work of Boltanski and Thévenot (1991), expands the framework by considering two other quality dimensions, which are also particularly important for wine as a product under analysis: the *opinion* convention grasps on personal assessments of external actors (wine specialists and journalists, for instance) and the *inspiration* convention, which evaluates quality through personality and creativity embedded in the product, i.e., the uniqueness and cult of the winemaker.

Taking into account the available data, in this work we look through the lens of five out of the six Ponte assessment guidelines: *market*, *industrial*, *opinion*, *inspiration* and *domestic* conventions. Table 4 summarizes the indicators to be analyzed, and indicates their respective data sources.

Table 4: Summary of quality dimensions under assessment

Quality convention	Indicator	Data Source
Market	Evolution of export unit values (Portugal)	COMTRADE
	Evolution of export unit values (compared)	COMTRADE
	Evolution of Export Price Segment Location	COMTRADE
Industrial	Number of wine-related patent/utility model and industrial design requests	INPI
Opinion	Evolution of the number of Portuguese wines reviewed by the Wine Spectator	Wine Spectator
	Evolution of Wine Spectator average score of Portuguese wines	Wine Spectator
	Number of Portuguese Wines in Wine Spectator Top 100	Wine Spectator
Inspiration	Evolution of registered Madrid Trademarks, Nice cat.33, per Mhl of wine produced	WIPO, OIV
Domestic	Share of DOP wine exports over total wine exports (value)	IVV, I.P.

The *market* convention is assessed through the computation of unit values and the analysis of their evolution over time. Based on this computation we also undertake an assessment of Portuguese wine export shares in low, medium and high price segments. This is done comparing the Portuguese case with the main world producers indicated in the previous chapter: OW countries France, Germany, Greece, Italy, Portugal, Romania and Spain; and New World countries Argentina, Australia, Brazil, China, Chile, South Africa and the United States.

As for the *industrial* perspective, we take into account the number of wine-related registered patents and industrial designs to measure industrial innovation performance. Patent data is a useful source of industrial innovation data, as it deals exclusively with new and useful ideas which signal technological change. These inventions may be related with technological progress in the winemaking process itself, but also with packaging and distribution inventions. We evaluate the evolution of filed patent and industrial design requests, considering only those requests which are declaredly related with the wine industry. The analysis is made also in comparison with France, one of the industry's leaders, widely recognized for producing and exporting high quality wines.

The *opinion* convention will be assessed through the analysis of data on awards and rankings set up by Wine Spectator (WS), one of the most renowned publications in the field. By looking at the number of reviewed Portuguese wines in WS's yearly issues, as well as their average score and their presence in a year-to-year Top 100 selection, it is possible to understand how these wines are positioned in terms of quality as perceived by market influencers.

The *inspiration* convention, although deeply related with the opinion dimension as the cult wines are usually those which are positively reviewed by international experts, is evaluated through the evolution of wine registered trademarks. International trademarks reflect the uniqueness of a certain winemaker and may signal the worldwide perception of it.

Finally, the *domestic* vision of quality is analyzed through the evolution of DOP wine export shares. As previously discussed in section 3.3, origin protection schemes are regulated by the European Union and work as intellectual property by certifying the authenticity of a given product. They serve as a guarantee for the consumer that those products are produced, processed and prepared in a given geographical area using recognized know-how, and are therefore highly valued.

4.2. The market convention: unit values as a proxy for quality

Unit values of wine exports (UV_X) are computed for both the relevant OW and NW wine producers identified previously. Computations are based on data from COMTRADE (United Nations Commodity Trade Statistics Database), which provides annual international trade statistics data detailed by commodities and partner countries and can be accessed through its official website located at *http://comtrade.un.org/db.*

Calculations are made considering all wine SITC[11] Rev.3 wine categories with the highest level of disaggregation available for wine products (five-digit) presented in Table 5.

[11] Standard International Trade Classification.

Table 5: SITC Rev.3 5-digit categories for Wine

SITC Rev.3	Description
11211	Grape must in fermentation/with fermentation arrested othw. than by the addition of alcohol
11213	Vermouth & other wines of fresh grapes flavoured with plants/aromatic substances
11215	Sparkling wine
11217	Wine of fresh grapes (other than sparkling wine); grape must with fermentation prevented/arrested by the addition of alcohol

Source:COMTRADE

The SITC classification is the most appropriate in this case, as it distinguishes among categories based solely on the type of product, while other classifications, namely the Harmonized System (HS), also use criteria such as the size of the package in the categorization. The analysis is conducted for a broad 20-year period (1992-2012), although in some cases the available data is restricted to the more recent decade: data for Chile are only available between 2003 and 2011, for South Africa between 2000 and 2011. Also, no data are available for France regarding 2012.

In order to assess the relative importance of each wine category in Portuguese wine exports, a preliminary quantification of their respective shares has been made (Figure 12). Results show that the only relevant category in Portuguese exports, representing more than 97.5% of total exports for the whole period, is the 11217 category (*Wine of fresh grapes (other than sparkling wine); grape must with fermentation prevented/arrested by the addition of alcohol*), including table wines and fortified wines.[12] Despite the slightly decreasing trend since 2001, this category has consistently been, by far, the most representative in the Portuguese wine export basket. We thus consider only this category in unit value calculations. Computations are made obtaining nominal values (US dollars) per kilogram.

[12] Fortified wines are wines with fermentation prevented by the addition of alcohol.

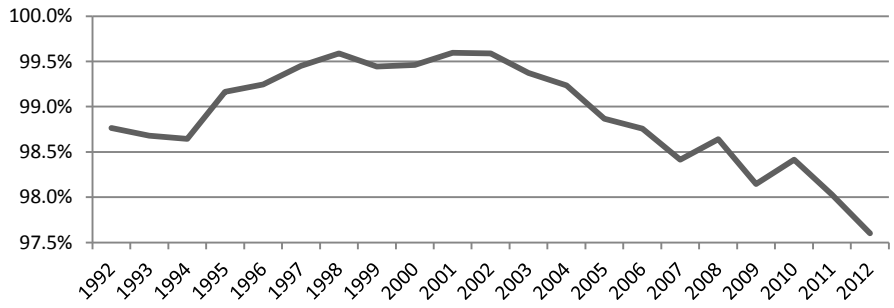


Figure 12: Share of SITC Rev.3 11217 in total wine exports (US dollars), Portugal

Source:COMTRADE and author's calculations

Although unit values are the most comprehensive and frequently used measure of quality, there is a potential shortcoming from its computation: the fact that they can reflect input cost differences, rather than quality (cf. Section 2.3.) In order to check for the accuracy of unit values as a measure of quality, we thus compute Revealed Quality Elasticity (RQE) indices. The assumption on the basis of this computation is the following:

"If unit values reflect costs and the product is homogeneous, then countries with lower costs should be net exporters in quantities and countries with higher costs should be net import countries. If a country is a net exporter in quantities, despite the fact that it has higher unit values, then this must be due to quality differences. This assertion makes use of the fact that economic theory tells us that under quite broad circumstances demand is price elastic." (Aiginger, 1997, pp.575-6)

In other words, if industries in high prices (higher unit values in exports relative to imports) are associated with lower exported quantities relative to imported quantities, then they are revealed to be *price elastic*. In contrast, industries in which the signs of (net) prices and (net) quantities are the same are seen as *quality elastic*. In case this last hypothesis holds true for wine as an industry and particularly for the Portuguese case, then we can more confidently look at unit values as a measure of quality, rather than cost.

To this purpose, we compute net prices (relative unit values of exports to imports ($RUV=UV_X/UV_M$)) and net quantities (year's coverage rate of imports by exports, using quantity data) and analyze the relationship between those two indicators. We do so for country (reporter) – world (partner) trade relationships, taking as reporters

the group of main wine producers identified in chapter 3.5., which altogether have been responsible for 88.3% of category's 11217 exports in the period under analysis (1992-2012). To avoid potential misjudgment from the arbitrary selection of one year, we analyze the relationship between the two indicators for three reference years: 1992, 2002 and 2012.

If the RUV results show that the values are above unity, then we conclude that the reporter country exports higher priced products than it imports, therefore, the sign of net prices is positive. We then proceed to verify the sign of net quantities, which in this case is given by the year's coverage rate of imports by exports, using quantity data in kilograms (X/M kg). If this rate is above unity, then the country is a net exporter, i.e. the sign of net quantity is positive. The RQE is given by the share of identical sign pairings, and the indicator may range between 100% (all bilateral relations of relative prices and quantities have identical signs, therefore the industry is completely quality elastic) and 0% (all bilateral relations of relative prices and quantities have opposite signs, therefore the industry is completely price-elastic).

Table 6 - Bilateral relations RUV and X/M (kg) for SITC Rev.3 11217

	1992	**2002**	**2012**
Argentina	≠	≠	≠
Australia	≠	≠	≠
Brazil	≠	=	=
Chile	≠	n/a	n/a
China	≠	≠	n/a
France	=	=	=
Germany	≠	≠	≠
Greece	≠	≠	=
Italy	=	=	=
Portugal	=	=	=
Romania	≠	≠	≠
South Africa	n/a	=	n/a
Spain	≠	≠	=
USA	=	=	=

Source:COMTRADE; own calculations

N/A: Not Available

Table 7: Revealed Quality Elasticity (RQE) for SITC Rev.3 11217

	Total	NW	OW
Cases	37	16	21
Identical sign pairings	17	6	11
RQE	45.9%	37.5%	52.4%

Source:COMTRADE; own calculations

Table 6 reveals the number of identical sign pairings (=) and opposite sign pairings (≠). Computing the share of identical pairings over the total number of available cases, we reach an RQE value of 45.9% (Table 7), which indicates that the industry category under analysis has slightly more price-elasticity than quality-elasticity. However, this is mainly due to the influence of NW countries such as Argentina, Australia, Chile and China. If we consider only OW countries, the RQE index rises to 52.4%. On the other hand, by looking specifically at the case of Portugal, we verify that although its export prices have been consistently higher throughout the years than its import prices, the country has remained a net exporter – i.e., throughout the years, Portugal has registered identical price and quantity sign pairings. Therefore, we conclude that Portuguese wine exports are *quality-elastic*, as world buyers demand these wines regardless of the fact that there are cheaper options available.

The next step consists therefore in the analysis of the evolution UV_X in Portugal and other OW and NW major producers.

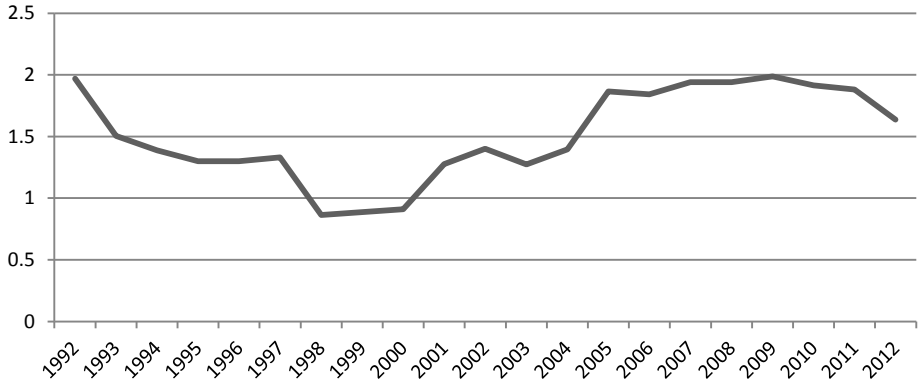


Figure 13: Evolution of export unit values ($/kg) (SITC Rev.3 11217), Portugal

Note: Prices deflated by Producer Price Index (PPI) for wine products

Source: COMTRADE; author's calculations

Figure 13 shows the evolution of Portuguese wine export prices during the period under analysis. Values were adjusted to inflation considering the Producer Price Index (PPI) for wine,[13] computed on the basis of producer prices as reported by INE's *Estatísticas Agrícolas* (several issues).

Unit value evolution for the period can be divided in two main phases: the first (1992-1998) is characterized by a decrease in price of more than 1$/kg throughout the years, while the second (since 1998) marks an inverse tendency, with UV_X growing from under 1$/kg in 2000 to around 2$/kg in 2009. It seems therefore that an upward trend occurs since the late 1990s, although the more recent years show a slight decrease in UVs.

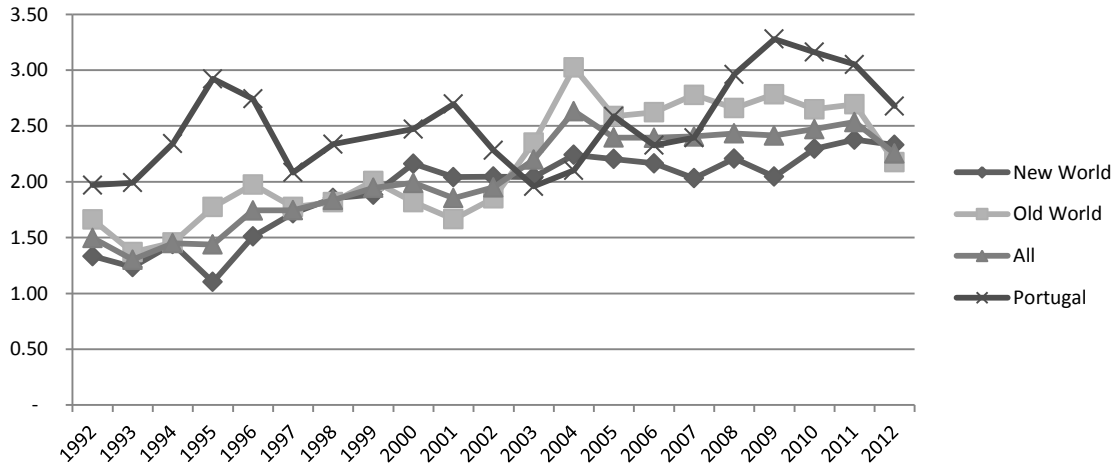


Figure 14: Evolution of export unit values ($/kg) (SITC Rev.3 11217); compared

Source: COMTRADE; author's calculations

The computation of UV_X for the aforementioned set of main wine producers (both OW and NW) has also been made, allowing a comparison of price evolution across countries.

Firstly, we have compared the evolution of Portuguese export price with the average export price[14] for these two groups of countries, as illustrated in Figure 14.

[13] More precisely, use is made of prices for table wines, which are the only prices available for the whole period under analysis.

[14] New World, Old World and All values are weighted means, in which weight depends on the countries' share of global exported volume

Through the inspection of this evolution we can conclude that the growth of Portuguese UV_X has been slower and more irregular than that of the average OW and NW export prices. The growth trend for these two groups of has been consistent throughout the period under analysis, with the price of OW exports rising particularly fast between 2001 and 2004 (almost doubled during this period)[15].

NW prices have grown around 1$/kg in the period under analysis and OW prices, if we exclude 2012 (the result for this year is heavily influenced by the lack of price data for France, whose export share was 25% in that same

Therefore, while in the first half of the period (1992-2003) the Portuguese price was consistently higher than the average OW and NW prices, this gap was significantly narrowed in the second half (2003-2012). In 2003-2004 and 2006-2007, the Portuguese export price was actually exceeded by the average OW UV_X .

Secondly, and in order to provide further detail to this analysis, we have created a price vector for all the producers' exports (cat.11217) for the same period, and calculated price terciles for each year, thus enabling the possibility of classifying each country profile into a low, medium or high price segment. Table 8 presents the results.

[15] The decrease verified in the "OW" and "All" values in 2012 is heavily influenced by the lack of unit value data for France, one of the largest exporters and a main player in the high-priced segment (cf. Table 8)

Table 8: Classification of wine exports according to price segment (1992, 2012; OW and NW countries)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	%L	%M	%H
Argentina	L	M	M	L	L	L	M	M	M	M	L	L	L	L	L	L	L	M	H	M	M	**48**	**43**	**5**
Australia	H	M	M	M	M	H	H	H	H	H	H	H	H	H	H	H	H	M	M	L	M	**5**	**33**	**62**
Brazil	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	**86**	**0**	**5**
Chile	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	M	L	M	L	M	M	L	L	M	*N/A*	**44**	**56**	**0**
China	M	M	H	H	*N/A*	H	M	L	M	H	H	M	L	L	H	H	H	H	*N/A*[1)]	*N/A*[1)]	*N/A*[1)]	**18**	**24**	**53**
France	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	*N/A*	**0**	**0**	**100**
Germany	H	H	H	H	H	M	M	M	M	M	M	H	M	H	H	H	H	H	H	H	H	**0**	**33**	**67**
Greece	M	M	M	M	L	M	L	M	L	L	M	L	H	M	M	H	M	H	M	M	H	**24**	**52**	**19**
Italy	M	L	L	L	M	M	M	L	L	M	M	H	H	H	M	M	M	M	M	M	H	**19**	**52**	**19**
Portugal	H	H	H	H	H	H	H	H	H	H	H	H	M	H	H	M	H	H	H	H	M	**0**	**14**	**86**
Romania	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	**100**	**0**	**0**
S. Africa	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	M	M	M	*N/A*	M	L	L	L	L	M	L	L	*N/A*	**55**	**45**	**0**
Spain	L	L	L	M	M	L	L	H	H	L	L	M	H	M	M	L	L	L	L	L	L	**52**	**24**	**14**
USA	M	H	M	M	H	H	H	H	H	H	H	M	M	M	M	M	M	M	H	H	H	**0**	**43**	**52**

Source: COMTRADE; author's calculations

Note: 1) Values not reported due to data irregularities.

2) Product category: SITC Rev.3 11217

3) H: High; M: Medium; L: Low; N/A: Not Available

From Table 8 it can be seen that in most years (86%) Portuguese prices are located in the high price segment, a percentage that is only exceeded by France, with 100% of prices classified as high; the remnant 14% are located in the medium price segment. This percentage is associated with 3 cases of medium price segment location which occur in the second half of the period (2004, 2007, 2012). This might signal a slight relative downgrade for Portuguese wines. German exports are also mostly high priced (67%). No other OW country has a majority of high prices; as for NW countries, more than 50% of occurrences are high priced in Australia, China and the United States (62%, 53% and 52%, respectively). Greece and Italy have a very similar structure, with predominance of the medium segment (52% in both cases). Spanish wines, on the other hand, are predominantly placed in the low segment (52%). Exports of NW producers Argentina, Chile and South Africa are mostly located in low and medium price segments; and, in the lower end of the price vector, Brazil and Romania, with 86% and 100%, respectively.

Independently of the overall distribution of each country's occurrences into different price segments, the identification of an upgrading trend is only possible if we find that there has been a shift of exports towards high price segments. We find that, independently of Portuguese UV_X own variations across the years, the country's exports have been persistently in high price segments when compared with other main producers. Although Portugal seems to be the one of the most quality-competitive economies in the wine industry (along with France), it is difficult to identify clear upgrading trends for any of the countries portrayed, given the constant shifts between the three segments; however, it is to note that some NW countries such as Argentina and Chile, although being late-movers in the global wine industry, are already practicing medium segment prices. Acquiring more experience (either from a product, process or functional point of view) may lead these countries to upgrade their exports to a higher segment in the near future.

4.3. Industrial convention: evolution on wine-related patents and designs

In order to assess the *industrial* dimension of wine quality upgrading, data on patents/utility models and industrial designs requests for wine-related products and processes registered in the country are analyzed. This information is available at INPI

(Portuguese National Institute of Industrial Property) through its website (*http://www.inpi.pt*). Wine-related requests are identified by the inclusion of the word "*vinho*" (wine) in the process summaries. Again, this is analyzed from a temporal perspective, to find out if the number of requests has changed markedly over time.

The INPI database includes various types of patents: national invention patent, European invention patent, and international invention patent; national and international utility models; and also supplementary protection certificates and semiconductor topographies.[16] The first registered wine-related utility model request dates back to 1949. In total, 56 requests have been filed (27 national invention patents, 11 national utility models and 18 European invention patents).

In what concerns industrial designs, the database considers the following types: national model or design; national industrial model; and national industrial design. The first registry dates from 1974, and to this date there are only 16 registered requests in total (8 national industrial models, 4 national industrial designs and 4 national models/designs).

Figure 15 shows the annual number of patent and industrial design requests since1990.

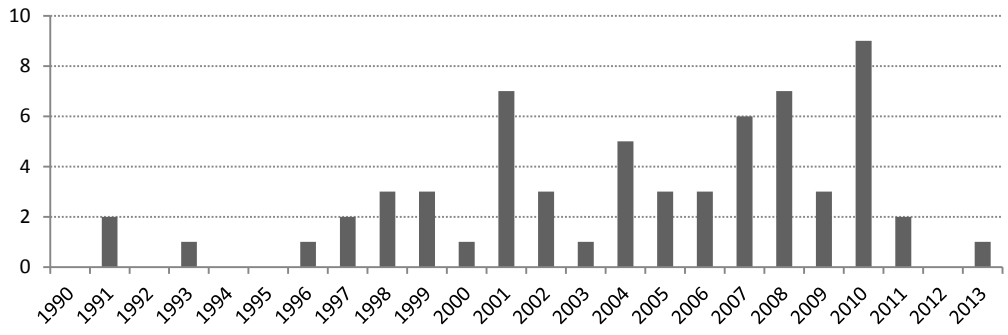


Figure 15: Number of wine-related patent/utility model and industrial design requests filed by year, Portugal

Source: INPI

[16] The difference between national, European and international invention patents is that the request is filed either directly to the national office (INPI), via the European Patent Office (EPO) or the World Intellectual Property Organization (WIPO), respectively. Patents and utility models differ as utility models, although having a simplified application process, do not protect inventions that use biological matter or chemical/pharmaceutical substances.

It is evident that the first decade of the 21st century was more proliferous in terms of wine-related industrial property requests. In fact, 76% of the requests were filed in the period between 2000 and 2010. However, absolute numbers per year were never above 9 (2010). Also, there are several years with no registered requests (1990, 1992, 1994, 1995 and 2012) and the figures regarding the three more recent years are rather low.

In order to make a comparative analysis with one of the sector's leaders, France, we have retrieved data from the French National Institute of Industrial Property (INPI-FR) through the official website *www.inpi.fr*, for international, European and national patents. In order to filter and obtain only wine-related patents, we used the same methodology as for the Portuguese case: patents are searched using the word "wine" (*vin*) in the request summaries. To allow the comparison, we compute the number of patents per thousand square kilometers (km^2) under vine, using OIV as the source for surface under vine data. Results are shown in Table 9.

Table 9: Wine-related patents

		2001 - 2003	2004 - 2006	2007 - 2009	2010 - 2012	Total
Portugal	Nr.of patents	7	11	14	10	42
	Nr. of patents per 1000 km2	2.8	4.4	5.7	4.2	17.1
France	Nr. of patents	83	83	49	46	261
	Nr. of patents per 1000 km2	9.3	9.3	5.7	5.7	30.0

Source: INPI, INPI FR, OIV, own calculations

The results demonstrate that, while in the first six years, France has registered significantly more wine-related patents per 1000 km^2, the second half of the period marks an approximation between the two countries.

The lower number of patent and industrial designs suggests that the industrial innovation in the Portuguese wine sector has not been very significant throughout the years. Although the results seems to suggest an improvement in relation to France, the low absolute number of patents filed does not allow us to conclude that there has been a clear upgrading in what industrial innovation is concerned.

4.4. Opinion convention: Wine Spectator ratings of Portuguese wines

As Caldas and Rebelo (2013) note, "*typically, wine is a good experience, where quality is not recognised before consumption, i.e., until one buys and opens a bottle its content and quality remain unknown. That is why wine consumers count on expert opinions expressed in wine ratings and critical reviews*" (op. cit., p. 103). These reviews seem to be increasingly important for consumers' perception of quality. Indeed, they have been used by authors such as Crozet *et al.* (2009), who relied on expert opinions to proxy quality for champagne. Caldas and Rebelo (2013) have identified a number of influential *raters*, both at the international and domestic levels which proved to give consistent ratings of Portuguese wines. At the international level, they have identified Robert Parker (author of the Wine Advocate, first published in 1978) and the Wine Spectator (WS) publication, whose first issue dates back to 1976 as top opinion makers on the field: according to the authors, a higher score from these reviewers leads generally to a higher price and increased sales and vice-versa.

Following Caldas and Rebelo's (2013) insights, in this work we use WS review scores in order to assess whether the average score for Portuguese wines has improved in the period under analysis. Data are available for the yearly issues from 2000 to 2014, but we will leave out 2014 as it might still be incomplete. WS reviewers classify the wines according to a 100 point scale with the score intervals described in Table 10.

Table 10: Wine Spectator 100 Point Scale

Score interval	Description
95 - 100	Classic: a great wine
90 - 94	Outstanding: a wine of superior character and style
85 - 89	Very good: a wine with special qualities
80 - 84	Good: a solid, well-made wine
75 - 79	Mediocre: a drinkable wine that may have minor flaws
50 - 54	Not recommended

Source: Wine Spectator

Results for Portuguese wines are shown in Table 11, which presents the total number of wines under assessment, their average scores, the highest and lowest scores

of each year, as well as specific information regarding Port and Madeira wines, the most famous Portuguese fortified wine categories.

It is important to bear in mind that these data are heavily influenced by production idiosyncrasies and vintage periods. For instance, there are no Port wine reviews for years 2002, 2004 and 2009, which may be due to the fact that some Port wines have only been barrel tasted (BT), i.e., Wine Spectator tasted barrel samples of unfinished wines, and may or may not have an attributed preliminary score. Other reasons for the absence of data in some cases, or great yearly variations, are related to the fact that, normally, the majority of Ports considered in WS are Vintage or Late Bottled Vintage, and are therefore highly dependent on the quality of a given year's vintage.

One of the first conclusions that can be drawn from Table 11 is that a growing number of Portuguese wines have been reviewed and scored by WS experts, as pictured in Figure 16. In 2013, there were almost five times more reviewed Portuguese wines than in 2000. This can be explained on two different grounds: the first is that there has been a greater acknowledgement of the quality of a wider variety of Portuguese wines; the second is a growing recognition by Portuguese wine producers of the importance of a public relations strategy that brings Portuguese wines closer to the influencers, which drives them to submit their wines for international tastings.

Table 11: Wine Spectator Yearly Issue Scores for Portuguese wines

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Nº of scored wines	77	91	214	233	91	158	273	231	228	269	369	346	370	362	3312
Average score	85.1	84.5	84.3	86.8	85.8	88.2	86.7	86.2	87.4	86.6	87.6	87.3	88.1	87.6	--
Highest score	98	90	92	98	95	96	97	94	100	95	100	100	98	98	--
Lowest score	69	74	72	73	73	68	73	76	72	69	78	73	81	78	--
Port	16	34	0	95	0	12	46	16	54	0	130	27	69	69	568
%Port	21%	37%	0%	41%	0%	8%	17%	7%	24%	0%	35%	8%	19%	19%	--
Av. Score Port	88.5	84.4	n/a	89	n/a	92.1	90.3	89.9	90.5	n/a	89.2	92	91	90.6	--
Madeira	8	0	12	0	4	10	5	0	6	0	2	0	5	0	52
%Madeira	10%	0%	6%	0%	4%	6%	2%	0%	3%	0%	1%	0%	1%	0%	--
Av. Score Madeira	94.3	n/a	87.1	n/a	87.3	89.5	89.4	n/a	88.2	n/a	90.5	n/a	90.8	n/a	--

Source: Wine Spectator, author's calculations

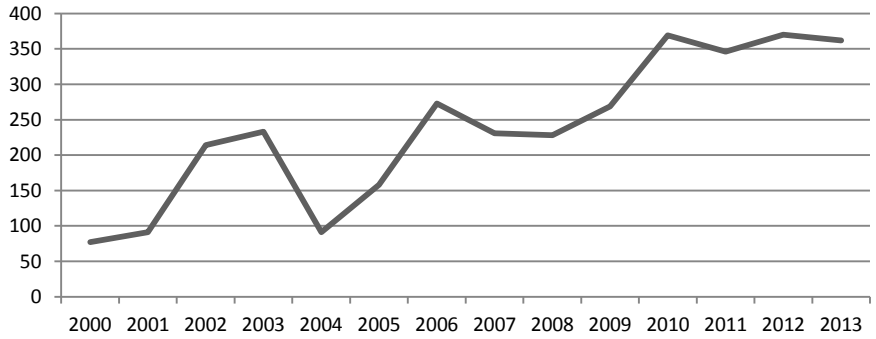


Figure 16: Evolution of the number of Portuguese wines reviewed by the Wine Spectator

Source: Wine Spectator

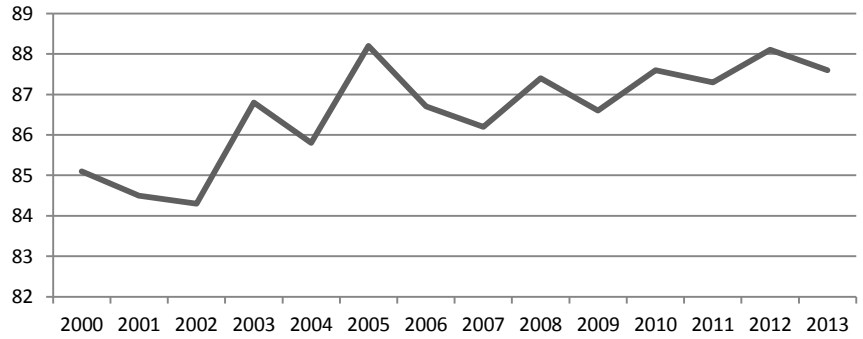


Figure 17: Evolution of Wine Spectator average score of Portuguese wines

Source: Wine Spectator

Regarding their average score, Portuguese wines have consistently been classified in the "Very Good" class. The only years in which the average was below 85 were 2001 and 2002 (84.5 and 84.3 respectively). Furthermore, there is a slightly growing tendency of average scores, as depicted in Figure 17. Over the period, this average score has grown about 3 points. Regardless of the share of Port and Madeira wines included in the reviews, which shows significant variation due to the reasons indicated above, it is evident that these two fortified wines register traditionally the highest scores among Portuguese wines. From 2005, Port wine has always been scored, on average, above 90 points, i.e. as "Outstanding" (with the exception of 2007, when it scored 89.9); and 2010 (scored 89.2). In 2008, 2010 and 2011, the highest score registered was 100, at the very top of the scale, and always for Port wines (FONSECA Vintage Port in 2008, DOW Vintage Port in 2010, QUINTA DO NOVAL Vintage Port Nacional in 2011). As for Madeira wines, which are quite rare, they have also been above 90 points in several occasions (2000, 2010, 2012). We can therefore conclude that table wines and sparkling wines, altogether, have lower average scores than the famous two fortified wines.

The importance of Port in Portuguese wine sales and marketing abroad is also clear from the analysis of Portuguese wines in the Wine Spectator Top 100. Every year, WS editors survey the wines reviewed over the previous 12 months and select a Top 100, "based on quality, value, availability and excitement" (Wine Spectator, n.d., para.1).

Table 12: Number of Portuguese Wines in Wine Spectator Top 100

Year	1989 - 1993	1994 - 1998	1999 - 2003	2004 - 2008	2009 - 2013	Total
Portuguese Wines (total)	1	13	5	12	15	46
Vintage Port	1	12	3	0	3	19
Other Port	0	1	1	0	1	3
Douro	0	0	1	11	10	22
Dão	0	0	0	1	1	2

Source: Wine Spectator

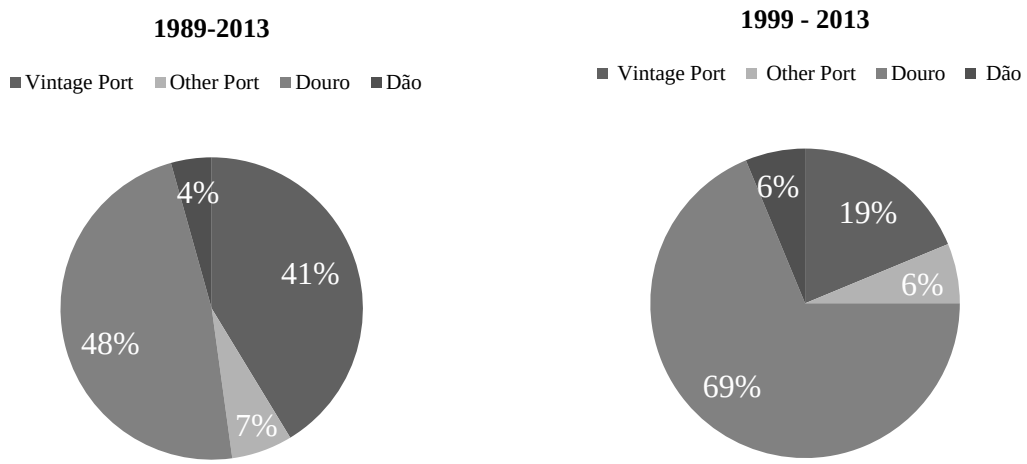


Figure 18: Distribution by wine type of Portuguese Wines in Wine Spectator TOP 100

Source: Wine Spectator

From the inspection of both Table 12 and Figure 18, it is evident that Port plays a prominent role as 41% of the Portuguese WS Top entries were Vintage Ports, plus 4% other Ports (such as Late Bottle Vintage and aged Ports).[17] But besides Port, it is interesting to note the importance of non-fortified Douro wines, which represent 48% of all entries in the period under analysis (1989 – 2013). In later years, Douro table wines have been gaining ground and for the period between 1999 and 2013 they represent 69% of all Portuguese entries to the Top 100.

This turn from Port to Douro wines seems to indicate that the well-known qualities of the Port have been persuading experts and influencers to engage in other wines from the same region where Port is produced, as claimed by Matt Kramer, the aforementioned famous wine critic: *"The table wines emerging from the Douro can be thrilling. Many —most even— are still works in progress. After all, nobody knew how to make table wine in the Douro. But they're learning mighty fast. The best wines are stunners, truly world-class in their originality, flavor distinction, character, depth and finesse."* (Kramer, 2014, para.14). However, as another WS author describes, *"while the Douro is the source of most of the top wines, other regions are making their presence felt, most notably the Alentejo, in the south central portion of the country, and Estremadura and the Dão, both of which lie between the Douro and Lisbon."*(Marcus,

[17] Table 16 in the Appendix includes a list of the wines in the WS Top 100, by year

2005, para.7). This assertion is in line with the presence of two *Dão* wines in the Top 100.

We therefore conclude that not only Douro wines have a great progress margin in terms of international promotion, but also wines from other Portuguese regions that have not yet been discovered by influencers. Overall, the analysis of indicators used to evaluate quality from the standpoint of the opinion convention seems to point out that quality has improved during the period under analysis.

4.5. Inspiration convention: uniqueness through 'soft' innovation

The evolution of wine quality from the perspective of the inspiration convention can be examined through the analysis of trademark requests. Trademarks are a widely used indicator to measure "soft innovation" (cf. Mendonça *et al*, 2004), i.e., to assess how creativity in marketing can add value to an industry's output – how it can *functionally* upgrade it. As reviewed by Schautschick and Greenhalgh (2013), there is a vast literature supporting the use of trademarks as a complement to the list of innovation metrics (e.g., Millot, 2012; Jensen and Webster, 2009).

In order to investigate if there has been positive progress in trademark registration in the Portuguese wine industry, we gathered data from the global brand database provided by the World Intellectual Property Organization (WIPO) (http://*www.wipo.int/branddb*) for products from category 33 of the Nice classification [18] (alcoholic beverages except beer), for the period between 1992 and 2013. The WIPO database provides records for a limited range of national trademark sources, but it also makes available data on international trademarks, a legal entity created under the Madrid Agreement (1891) and later reinforced by the Madrid Protocol (1989), which gives trademark applicants the ability to file one centralized request in order to obtain a bundle of national trademark rights, therefore allowing wider protection through a more efficient process. Regarding most of OW main producers (Portugal, France, Germany, Italy, Romania and Spain), all records of the WIPO database are Madrid Trademarks. However, NW producers Argentina, Brazil, Chile and South Africa are not members of

[18] The Nice Classification (NCL), established by the Nice Agreement (1957), is an international classification of goods and services applied for the registration of marks.

the Madrid Agreement, and therefore no results are available for these countries. The remnant NW main producers (United States, Australia and China), as well as Greece, have joined the Madrid Union about a century later than other OW countries, and the use of the international trademark is not significantly widespread. For instance, in 2013, only 3.6% of the trademark applications originating from the United States in Nice category 33 were filed as Madrid trademarks (96.4% were United States Trademarks). Given these limitations, the comparison of international trademark registration is drawn only for OW main producers, with the exception of Greece. To allow for a more reasonable comparison, we compute the number of trademarks per million hl (Mhl) of produced wine,[19] using OIV as the source for yearly production data. The results are shown in Table 13, and the illustration of trends between 2000 and 2012 is depicted in Figure 19 below.

The most distinctive case is that of Germany, with significantly more registered trademarks in relation to production volume than any other country under analysis. However, the distance between Germany and all other countries is narrowed by the end of the period under analysis due to a decreasing trend in German trademark registration as well as to an increase in countries such as France, Italy and Spain. Portugal, on the other hand, shows a quite irregular evolution, making it difficult to identify a clear pattern (see Figure 20).

[19] Due to the volatile nature of wine production, which depends on factors such as weather conditions, we have considered an average value of production for the period under analysis.

Table 13: Madrid Trademarks, Nice category 33

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
France	Trademarks	242	199	202	208	221	274	262	279	303	263	330	453	408	**3644**
	Trademarks per Mhl	4.91	4.04	4.10	4.22	4.48	5.56	5.32	5.66	6.15	5.34	6.70	9.19	8.28	**73.93**
Germany	Trademarks	226	226	221	287	252	250	263	178	194	156	183	183	159	**2778**
	Trademarks per Mhl	22.94	25.42	22.36	35.04	25.18	27.31	29.50	17.35	19.42	16.91	26.50	20.04	17.64	**305.60**
Italy	Trademarks	114	97	112	141	186	171	198	215	203	183	205	247	257	**2329**
	Trademarks per Mhl	2.43	2.07	2.39	3.01	3.96	3.64	4.22	4.58	4.33	3.90	4.37	5.26	5.48	**49.64**
Portugal	Trademarks	41	20	37	18	17	27	22	37	29	14	10	24	19	**315**
	Trademarks per Mhl	6.59	3.21	5.95	2.89	2.73	4.34	3.54	5.95	4.66	2.25	1.61	3.86	3.05	**50.62**
Romania	Trademarks	1	2	20	2	11	20	11	6	8	5	5	13	17	**121**
	Trademarks per Mhl	0.21	0.41	4.12	0.41	2.26	4.12	2.26	1.24	1.65	1.03	1.03	2.68	3.50	**24.91**
Spain	Trademarks	61	85	61	89	102	118	125	120	129	96	76	86	146	**1294**
	Trademarks per Mhl	1.68	2.34	1.68	2.45	2.81	3.25	3.44	3.30	3.55	2.64	2.09	2.37	4.02	**35.60**

Source: WIPO, OIV, author's calculations

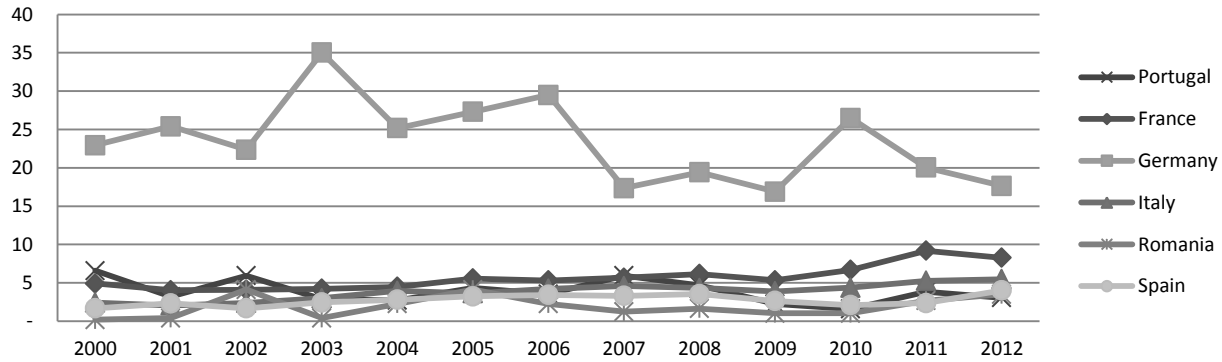


Figure 19: Evolution of Madrid Trademarks, Nice category33, per Mhl of wine produced

Source: WIPO, OIV, author's calculations

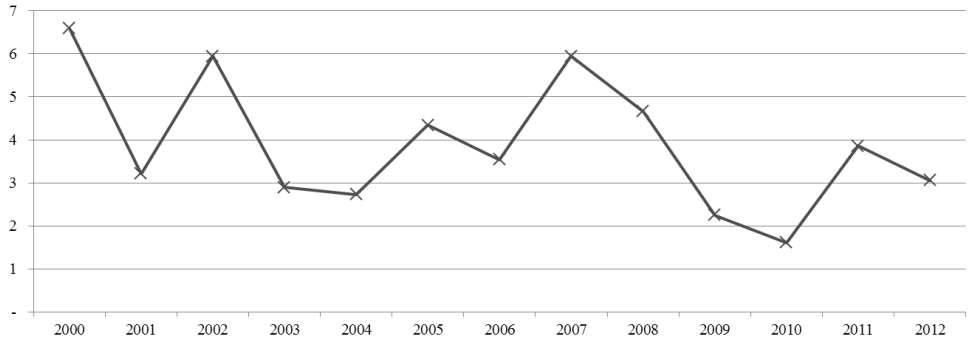


Figure 20: Evolution of Madrid Trademarks, Nice cat.33, per Mhl of wine produced; Portugal

Source: WIPO, OIV, author's calculations

However, we can see that the lowest trademark values have registered in more recent years, namely 2009 and 2010, which may suggest a slight downgrade.

Nevertheless, it is worth noting that by looking at the total number of registered trademarks per production unit in all listed countries (Table 13), Portugal ranks 3rd with 50.62 Madrid Trademarks per Mhl produced, after the undisputable leader Germany (305.60) and France (73.93).

As indicated earlier, the opinion and inspiration dimensions are much interconnected. According to Ponte (2009), 'inspiration' is related to values such as creation, innovation, vision and uniqueness. It can, therefore, be attributed to public relations efforts (e.g., interviews with trade magazines or visits and tastings at the property with prospective buyers) and also to product marketing, through the development of successful labels and designs.

We have seen above that although Portugal has not been following an upgrading path in terms of global trademark registration in the last decade, it has an interesting number of total trademarks when compared to other main producers. The explanation for this fact might reside in the industry's maturity in the country: in fact, some of today's main wine brands have been the first national trademarks ever to be registered, according to the INPI database (*http://www.inpi.pt*).

Being the most recognized wine region in the country, the Douro has been responsible for much of these marketing efforts, in many creative ways besides trademark registry. In fact, there are several examples which portray the creativity of Douro producers. For instance, the brand Niepoort (which has the oldest trademark request in INPI, dating from 1891) developed storyboard labels adapted by destination

market, in order to appeal to the final consumer. Initially thought for the German market (see Figure 21), the label's success dictated the making of new differentiated labels for 14 other countries, resulting in what Niepoort calls "*a logistical nightmare but a rewarding project*" (Niepoort, n.d., para.1).

Figure 21: FABELHAFT, German label for Niepoort wine

Source: Niepoort

Some Port producers are also very aware of the power of bottling and marketing for a sense of uniqueness. Back in 2008, the wine makers at The Fladgate Partnership (owner of the brands Taylor's, Croft and Fonseca) discovered a wine that was over 150 years in age and, as part of a strategic decision, decided to market it under a new label, *Scion*, and with a special packaging, as a unique collector's item (Figure 22). The wine is currently valued with an average price of 2384€ per bottle in the international wine marketplace 'Wine Searcher' (http://*www.wine-searcher.com*). The Symington Family Estates (owners of the brands Graham's, Cockburn's, Warre's, Dow's, Quinta do Vesúvio and Altano) have also engaged in old wine bottling for collectors, and created the very exclusive *Ne Oublie*, with only 656 bottles available for 5500€ a bottle. The wine is sold in a handmade crystal decanter with silver bands and lays inside a box of handcrafted leather (Figure 23). According to Paul Symington, managing director of the Symington Family Estates, "if Port wine cannot have a product of the same level as

Hermès, Cartier or Louis Vuitton, that means we recognize that we are on a second level"[20] (Garcias, 2014, para.2).

Figure 22: Taylor Fladgate Scion 1855 Vintage Tawny Port

Source: Living Wine (http://www.living-wine.com)

Figure 23: Graham's *Ne Oublie*

Source: Graham's Port (http://www.grahams-port.com)

[20] Our translation from the original text in Portuguese: *"Se o vinho do Porto não consegue ter um produto ao nível da Hermès, da Cartier ou da Louis Vuitton, significa reconhecer que estamos num segundo nível"*.

4.6. Domestic convention: evolution of DOP wines

Working on data available on IVV, the Portuguese National Institute of Wine and Vine (http://*www.ivv.min-agricultura.pt*), it is possible to find disaggregated data which gives us information about the volume and value of exports of DOP wines. This certification works as an intellectual property right, establishing a monopoly on a certain variety of product, and certifies its quality in the eyes of the consumer, thus allowing the establishment of a price premium in many cases. As indicated earlier, an increase in the share of DOP wine exports over total exports indicates an overall quality upgrading.

We were able to collect IVV data on Portuguese wine exports for a ten year period, between 2000 and 2009, which will allow us to get a more comprehensive picture of the recent evolution of the Portuguese wine industry.

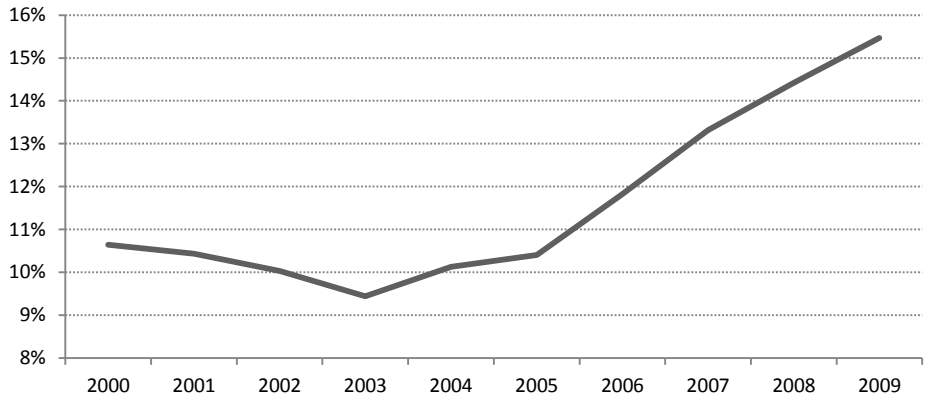


Figure 24: Share of DOP wine exports over total wine exports (value), Portugal

Source: IVV, I.P.

The evolution illustrated in Figure 24 can be roughly divided into three stages: the first one, between 2000 and 2003, in which the DOP share has decreased almost 2% (from 11% to 9%); the second, between 2003 and 2005, in which it has grown moderately (about 1%); and finally, between 2005 and 2009, a steady growth of 5%. In 2009, DOP exports represented more than 15% of the total exported value. This growth is indicative of a quality improvement in the composition of Portuguese wine exports. However, this composition enhancement is not directly reflected on unit value evolution, as seen by the analysis performed in section 4.2.

4.7. Evidence on Portuguese wine quality upgrading: summary and discussion

The evidence provided by the analysis performed in the previous sections shows that different measures of quality may present different upgrading trends. A summary of these trends can be found in Table 14 below. We can conclude that, although Portuguese wine exports are among the highest-priced wine exports (much due to the large share that fortified wines take on global wine exports), overall their relative prices have not grown in the last two decades. By comparing the Portuguese UV_X evolution with that of OW and NW main producers, we verify that the latter show a steady growth trend, therefore gaining ground in terms of quality competitiveness from a market perspective.

The same conclusion can be drawn from the price segment analysis. The emergence of new players in the high-priced segment such as Argentina and Chile, may be the cause of the Portuguese price segment downgrades in 2004, 2007 and 2012 from a high-priced segment to a medium-priced segment. Therefore, from a market perspective, Portuguese wines did not *upgrade*. Their relative price position has, in fact, been downgraded in comparison to other players in the international market, whose prices have grown at a faster pace.

However, the price evolution does not match the trends observed in innovation and technology content of the wine industry, assessed through the analysis of the number of patents. In fact, the number of requested wine related patents has been higher in the second half of the period under analysis, suggesting a more intense technological activity with industrial application. In any case, the total number of requests is still very low (Portugal has registered 17.1 patent requests per 1000 km2 in the whole period under analysis – see Table 9, p.50), which does not allow us to confidently state that there has been significant upgrading from this standpoint.

Table 14: Quality evolution for the Portuguese wine industry: summary of results

Quality convention	Indicator	Data reference	Period	Result	Upgrading
Market	Evolution of export unit values (Portugal)	Figure 13, p.44	1992-2012	No clear trend for the entire period; decreased about 1$/kg between 1992-2001; increased on the same scale in the following years.	=
	Evolution of export unit values (compared)	Figure 14, p.45	1992-2012	NW and OW average UV_X have grown faster than Portuguese prices; while in the 1st half of the period, Portuguese UV_X were higher, the gap narrowed in the second half	-
	Evolution of Export Price Segment Location	Table 8, p.47	1992-2012	Consistently located on high price segments; however, there are 3 cases of medium price segment location in the second half of the period (2004, 2007, 2012).	-
Industrial	Number of wine-related patent/utility model and industrial design requests	Figure 15, p.49.	1990-2013	Increased; particularly from 2000 onwards.	+
Opinion	Evolution of the number of Portuguese wines reviewed by the Wine Spectator	Figure 16, p.53	2000-2013	Increased; it grew about 5 times during the period under analysis.	+
	Evolution of Wine Spectator average score of Portuguese wines	Figure 17, p.53	2000-2013	Increased; the average score grew about 3 points during the period under analysis.	+
	Number of Portuguese Wines in Wine Spectator Top 100	Table 12, p.54	1989-2013	Increased the number of Douro wines, to the detriment of Port wines.	=
Inspiration	Evolution of registered Madrid Trademarks, Nice cat.33, per Mhl of wine produced	Figures 19, p.58 and 20, p.59	2000-2012	Irregular evolution with a mild decreasing trend.	-
Domestic	Share of DOP wine exports over total wine exports (value)	Figure 24, p.62	2000-2009	Increased; particularly from 2005 onwards.	+

From the perspective of the opinion convention, analysed through Wine Spectator classifications and rankings, Portuguese wines show an interesting upgrading trend. Although only available for the period between 2000 and 2013, data on the score attributed to Portuguese wines by WS reviewers show that not only the number of reviewed Portuguese wines has grown, but also their average score. As for the number of wines in the WS TOP 100, it varies greatly so that there is not an identifiable trend; however it is worth mentioning that the type of wines present in this ranking have been shifting from fortified wines to table wines, more specifically from Port wines to table wines produced in the Douro region. This suggests a shift in paradigm in how Portuguese wines are perceived by high rank influencers – Portuguese wine seems to have ceased to be a synonym with Port.

The growing acknowledgement of Portuguese wines in the reference magazine does not correspond, however, to a higher number of global registered trademarks (or Madrid trademarks). In the period between 2000 and 2012, the number of registered Madrid trademarks has decreased mildly. The reason behind this may reside in the fact that Portugal, being one of the oldest players in the industry, is also the home for some of wine's oldest brands; and, in the wine business, tradition is often equated with quality. This is why producers such as Niepoort focus their marketing efforts not in developing new brands, but on creative ways to make their brand closer to the consumers that they wish to target.

Finally, from the perspective of the domestic convention, measured through the share of DOP exports, there are positive signs of upgrading. The share of wines with protected origin denomination, which are higher valued in national and international markets, has been rising since 2003. However, this growth was not reflected into price upgrading.

5. Conclusion

In the present study, an attempt was made to analyze the quality upgrading trends of Portuguese wine over the last decades using an innovative and wide combination of quality measures.

The importance of quality-based competitiveness and the benefits of moving into higher quality production segments have recently been brought to the light by economic theory, which traditionally saw competitiveness as an ability to become more efficient and sell at lower prices (Melitz and Ottaviano, 2005; Helpman *et al*., 2004; Bernard *et al*., 2003; Melitz, 2003). Following these theoretical developments, several empirical studies have recently addressed the role played by quality features, in the lines put forward by New Trade and GVC theories, finding in many cases a positive relationship between the quality content of exports and overall levels of development (e.g., Khandelwal, 2010; Hallak and Schott, 2008; Hummels and Klenow, 2005; Schott, 2004). At the specific firm-level, quality may be linked with higher productivity (Johnson, 2012; Kugler and Verhoogen, 2012; Verhoogen, 2008), greater revenues (Manova and Zhang, 2009) and even the probability of foreign market entry (Crozet *et al.*, 2009).

Assuming that quality issues are determinant aspects of global competitiveness and well-being, a question naturally emerges: how can firms and countries achieve sustained improvements in quality? Theoretically, the answer has been closely intertwined with the concept of *upgrading*, i.e., the movement within the value chain from one stage of production to another with higher value-added activities and increased benefits (cf. Cattaneo et al., 2013), an effort that comprises a multitude of complementary areas, such as product and process innovation, the development of new functions such as marketing and R&D, and the diversification of production by transferring knowledge created in a particular sector to different levels of application (Cattaneo et al., 2013; Ponte and Ewert, 2009; Humphrey and Schmitz, 2002).

Although the analysis of quality upgrading can be performed in virtually every industry, wine production is particularly worthy of attention, since it encompasses a panoply of potential quality indicators, which are typically not available in other products/industries. The multitude of aspects taken into account in this industry is systematized by Ponte (2009), who, as indicated earlier, adds to traditional

measurement indicators, quality dimensions based on expert evaluations and on the uniqueness of wine. Based on Ponte's framework, we have analyzed the evolution of quality standards of the Portuguese wine industry through the viewpoint of five different dimensions, using a highly diversified number of quality proxies and data sources.

Overall, our findings show that there is a clear upgrading effort on two fronts: opinion and domestic dimensions. Also, there is more innovation embedded in wine production and consumption, as indicated by the results of patent analysis (industrial convention). The trends observed in these three dimensions of quality, however, have not been reflected on the evolution of price, i.e. Portuguese wines remain in the same price segments, or have moved to even lower ones, in comparison to the world's main wine producers. Portuguese winemakers seem to be struggling to promote their highest quality wines abroad by making themselves available to be under the scrutiny of international reviewers, while trying to distance themselves from the traditional image of Portugal as a single producer of Port and Madeira, and by capitalizing on the wide range of native grape varieties that exist in the country. However, while Port wines rely on their century-old tradition as one of oldest-traded and highly appreciated fortified wines in the world, to make themselves highly valued, new table wines made from native varieties still need to be heavily publicized.

This is a particularly important challenge as, to succeed in international markets, Portuguese wines need to be quality competitive, rather than price competitive. Although Portugal has a very large area under vine comparatively with other countries, production is highly fragmented and the average output quantity per producer is relatively low compared with other countries, namely the US and Australia. Also, viticultural processes are still quite traditional (Monitor Group, 2003), which can actually be an asset for value creation when competing in low volume segments, if adequately advertised. In other words, Portugal's exports need to remain *quality-elastic*, and avoid competition in large volume/low price segments. This should be the basis of export market selection: export destinations do not need to be large, but they need to have potential in terms of *premium* segment market value; and also the basis of distribution channel selection: specialty retail and quality hotels and restaurants will probably be better channels than hypermarket chains.

Another challenge is to make the wide variety of grape types to become a factor of consumer interest, rather than a factor of strangeness and, therefore, consumer dissuasion. According to a market study made by Wine Intelligence to the IVV, British and American consumers who do not drink Portuguese wines have difficulties relating the concept of "wines of Portugal" with any particular attributes; they have identified a very significant lack of familiarity with Portuguese wines (IVV, 2008). One of the solutions to develop familiarity was the creation, in 2008, of the brand "Wines of Portugal" by the IVV (Figure 25). The goal was clear: to increase the perceived value of Portuguese wines, leveraging their growth in market value. The brand's message endorses diversity: the wines of Portugal are "a world of difference" with many different regions, *terroirs*, grape varieties, techniques and producers. The brand seeks to position Portuguese wines not only as diverse, but also as genuine, world class wines that provide very high value for money. The umbrella brand aims to be able to reach consumers in new destination markets, where private brands or even geographical indications do not have an impact in terms of perceived quality.

Figure 25: Wines of Portugal Logo

Source: Wines of Portugal (winesofportugal.info)

The overall impact of the brand in value creation for Portuguese wines is, however, still uncertain. In terms of unit value evolution, analyzed in this work, data for the years following the creation of the brand (2009 – 2012) actually show a slight

decrease. However, as building a brand is not an immediate accomplishment, it might still be too early to evaluate the results of this marketing effort.

Besides this concerted branding effort, there is a wide range of financial incentive programs for the internationalization of Portuguese wines, within frameworks such as the European Social Fund (ESF) SME qualification incentives, the European Agricultural Guarantee Fund (EAGF) or IVV's promotion programs funded by wine and wine products taxation, which are aimed at information and promotion actions. However, according to ViniPortugal (2011), the investment execution rates for these incentives peaked at 55% in 2011, meaning that almost half of the approved investment was not used. In this context, it seems to be of utmost importance to investigate the reasons behind low execution, which may be hindering the development of new competitive capabilities.

Understanding the ineffectiveness of incentives and engaging in a consistent measurement of the return on investment of marketing actions, as well as the impact of diversification are, therefore, topics that need to be explored in further investigation. Furthermore, it is not clear how firm diversification is affecting wine sales abroad. More specifically, it remains ill-defined whether recent investments in wine tourism are affecting the image of Portuguese wines for international consumers and, consequently, affecting Portuguese wine sales abroad. In 2013, *Turismo de Portugal, I.P.*, the national tourism institute, has included the "Food & wine" segment as one of the main strategic tourism products in the country, and plans to develop new wine tourism itineraries in coordination with local actors (Turismo de Portugal, I.P., 2013). Wine tourism is a prime example of *intersectoral upgrading*, and many firms which used to exclusively focused on wine production and sales seem to be acknowledging that, as wine tourism projects multiply (most of them co-funded by EU innovation funds). Examples such as the Fladgate Partnership's *The Yeatman*, a 32.5 million wine-themed hotel in Porto, which includes a "vinotherapy" spa with "red wine barrel baths"or the 44 million L'And Vineyards Luxury Wine Resort in the Alentejo region are prime examples of this effort. However, wine tourism projects are usually evaluated in terms of their contribution to the firm's revenue diversification and also of their impact in the development of the local economy. It remains unclear whether these investments also play a role in promoting the consumption of Portuguese wines abroad and, if so, to what extent they are influencing sales.

The analysis performed provides valuable insights regarding the quality trends of the wine industry. However, it may be complemented and extended in a number of ways. Although this study already integrates a significant number of quality proxies used, additional indicators could be used, such as the evolution of workforce educational levels and skills and business expenditure on R&D (BERD) and marketing. Due to the lack of data disaggregated to the industry level, this may require the use of research strategies such as the elaboration of case studies or the collection of firm-level data via direct interviews and observation. Furthermore, it would be instructive to investigate further on the relationship between the various indicators used, e.g. if a score increase in international specialized press increases firm-level prices, replicating the work of Crozet *et al.* (2009) for the Portuguese case. The results of an analysis of this nature would be able to enlighten both firm managers and policy makers about the most important factors influencing the sector's quality competitiveness in international markets.

References

Afonso, O. and Aguiar, A. (2004) "Comércio Externo e Crescimento da Economia Portuguesa no século XX", Working Paper nº146, Faculdade de Economia da Universidade do Porto

Aiginger, K. (1997) "The use of unit values to discriminate between price and quality competition", *Cambridge Journal of Economics*, vol.21, no.5, pp.571-592

Aiginger, K. (2000) "Europe's position in quality competition", Enterprise DG Working Paper, Austrian Institute of Economic Research (WIFO) for the European Commission

Alvarez, R. and López, R. (2005) "Exporting and performance: evidence from Chilean Plants", *Canadian Journal of Economics*, vol.38, no.4, pp.1384-1400.

Amiti, M. and Freund, C. (2010) "The Anatomy of China's Export Growth", in *China's Growing Role in World Trade*, Feenstra, R. and Wei, S. (editors), National Bureau of Economic Research, University of Chicago Press, pp.35–56

Arnold, J. M. and Hussinger, K. (2005) "Export Behavior and Firm Productivity in German Manufacturing: A Firm-Level Analysis", *Review of World Economics (Weltwirtschaftliches Archiv)*, vol. 141, no.2, pp.219-243

Asplund, M. and Nocke, V. (2006) "Firm Turnover in Imperfectly Competitive Markets", *Review of Economic Studies*, vol. 73, no.2, pp.1-53

Balassa, B. (1965) "Trade Liberalisation and "Revealed" Comparative Advantage.", *The Manchester School*, vol.33, no.2, pp.99–123

Baldwin, R. (2012) "Global Supply Chains: Why They Emerged, Why They Matter, and Where They Are Going", Working Paper FGI-2012-1, Fung Global Institute

Baldwin, R. and J. Harrigan (2011) "Zeros, Quality, and Space: Trade Theory and Trade Evidence", *American Economic Journal: Microeconomics*, vol.3, no.2, pp.60-88

Barreto, A. (1988) "O vinho do Porto e a intervenção do Estado", *Análise Social*, vol. 24, no.100, pp.373-390

Bernard, A. B., Eaton, J., Bradford, J.B. and Kortum, S. (2003), "Plants and Productivity in International Trade.", *American Economic Review*, vol. 93, no.4, pp.1268-1290

Bernard, A.B. and Jensen, J.B. (1999) "Exceptional exporter performance: cause, effect, or both*?", Journal of International Economics*, vol. 47, no. 1, pp.1-25

Bernard, A.B. and Jensen, J.B. (2004) "Why some firms export", *Review of Economics and Statistics*, vol.86, no.2, pp.561-569

Bernard, A.B., Jensen, J.B., Redding, S. J. and Schott, P.K. (2011) "The Empirics of Firm Heterogeneity and International Trade", Working Paper 17627, National Bureau of Economic Research

Bernard, A.B., Redding, S. and Schott, P. (2007) "Comparative Advantage and heterogenous firms", *Review of Economic Studies*, vol.74, no.1, pp.31-66

Boltanski, O. and Thévenot, L. (1991) *De la justification. Les économies de la grandeur (Justification:economies of scale)*, Paris: Gallimard

Caldas, J. and Rebelo, J. (2013) "Portuguese wine ratings: An old product a new assessment", *Wine Economics and Policy*, vol.2, no.2, pp.102-110

Cardoso, J.L., Costa, L. and Monteiro, N. (2003) *O Tratado de Methuen, 1703: diplomacia, guerra, política e economia*, Lisbon: Livros Horizonte

Cattaneo, O., Gereffi, G. Miroudot, S., Taglioni, D. (2013), "Joining, Upgrading and Being Competitive in Global Value Chains", Working Paper no. 6404, The World Bank

Chen, X. and Funke, M. (2013) "The dynamics of catch-up and skill and technology upgrading in China", *Journal of Macroeconomics*, forthcoming

CIA World Factbook (n.d.), Electronic access: https://www.cia.gov/library/publications/the-world-factbook, accessed on December 13th 2013

Clerides, S.K., Lach, S. and Tybout, J.T. (1998) "Is learning by exporting important? Micro-dynamic evidence from Colombia, Mexico and Morocco", *Quarterly Journal of Economics*, MIT Press, vol. 113, no.3, pp.903-947

Climaco, P., Silva, J.R., Laureano, O., and Tonietto, J. (2012) "O clima vitícola das principais regiões produtoras de uvas para vinho de Portugal", in Tonietto, J., Sotés Ruiz, V. and Gomez-Miguel, V. (eds.) *Clima, zonificacion y tipicidad del vino en regiones vitivinicolas Iberoamericanas*, pp.313-353, CYTED

Council Regulation (EC) No 479/2008 of 29 April 2008 on the common organisation of the market in wine, amending Regulations (EC) No 1493/1999, (EC) No 1782/2003, (EC) No 1290/2005, (EC) No 3/2008 and repealing Regulations (EEC) No 2392/86 and (EC) No 1493/1999

Crozet, M., Head, K. and Mayer, T. (2009), "Quality Sorting and Trade: Firm-level Evidence for French Wine", Working Paper no. 2009-14, CEPII

Devadason, E. (2009) “Malaysia-China network trade: A note on product upgrading”, *Journal of Contemporary Asia*, vol.39, no.1, pp.36-49

Ederington, J. and McCalman, P. (2008) “Endogenous firm heterogeneity and the dynamics of trade liberalisation”, *Journal of International Economics*, vol. 74, no.2, pp.422-440

Esteves, P.S. and Rua, A. (2013) “Is there a role for domestic demand pressure on export performance?”, Working Paper no.1594, European Central Bank

Eymard-Duvernay, F. (1989) “Conventions de qualité et formes de coordination”, Revue Economique, vol. 40, no.2, pp. 329–359

Fabião, C. (1998) “O vinho na Lusitânia: reflexões em torno de um problema arqueológico”, *Revista Portuguesa de Arqueologia*, vol.1, no.1, pp.169-198

Fasil, C.B. and Borota, T. (2013) “World trade patterns and prices: The role of productivity and quality heterogeneity”, *Journal of International Economics*, vol. 91, no.1, pp.68-81

Fernandes, A. and Paunov, C. (2013) “Does trade stimulate product quality upgrading?”, *Canadian Journal of Economics*, vol.46, no.4, pp.1232-1264

Garcias, P. (2014) “Ne Oublie, um vinho de 5500 euros que não se esquece”, Público, Electronic access: http://fugas.publico.pt/Vinhos/336590_ne-oublie-um-vinho-de-5500-euros-que-nao-se-esquece, accessed on July 6th 2013

Gereffi, G. (1999) "International Trade and Industrial Upgrading in the Apparel Commodity Chain.", *Journal of International Economics*, vol. 48, no.1, pp.37-70

Gereffi, G. (2005) “The Global Economy: Organization, Governance, and Development” in Smelser, N.J. and Swedberg, R. (eds.) *The Handbook of Economic Sociology*, pp.160-182: Second edition. Princeton

Gereffi, G. and K. Fernandez-Stark (2011) *Global Value Chain Analysis: A Primer*, CGGC, Duke University. Electronic access: http://www.cggc.duke.edu/pdfs/2011-05-31_GVC_analysis_a_primer.pdf, accessed on October 13th 2013

Gereffi, G., Tam, T. (1998) “Industrial upgrading through organizational chains: Dynamics of rent, learning, and mobility in the global economy”, paper presented at the 93rd Annual Meeting of the American Sociological Association, San Francisco, CA, August 21–25.

Gibbon, P. (2001). “Upgrading Primary Production: A Global Commodity Chain Approach”, *World Development*, vol. 29, no.2, pp.345-363

Gibbon, P., J. Bair, and S. Ponte (2008) “Governing Global Value Chains: An Introduction”, *Economy and Society*, vol.37, no.3, pp.315-338.

Giuliani, E., Pietrobelli, C. and Rabellotti, R. (2005) “Upgrading in Global Value Chains: Lessons from Latin American Clusters” *World Development*, vol.33, no.4, pp.549-573

Goto, K. and Endo, T. (2013) “Upgrading, Relocating, Informalising? Local Strategies in the Era of Globalisation: The Thai Garment Industry”, *Journal of Contemporary Asia*, forthcoming

Greenaway, D. and Kneller, R. (2007) “Firm heterogeneity, exporting and foreign direct investment”, *The Economic Journal*, vol. 117, no. 517, pp.F134-F161

Grossman, G. and Helpman, E. (1991) *Innovation and Growth in the Global Economy*. Cambridge, Massachusetts: MIT Press

Gwynne, R. (2006), “Governance and the wine commodity chain: Upstream and downstream strategies in New Zealand and Chilean wine firms”, *Asia Pacific Viewpoint*, vol. 47, no.3, pp.381–395

Gwynne, R. (2012), “Strategic evolution of Chilean wine firms: Vertical integration and upgrading in Chile's Colchagua Valley”, *Urbani Izziv*, vol.23, no. SUPPL. 2, pp.S36-S48

Hall, C. M. and Mitchell, R. (2000), “Wine Tourism in the Mediterranean. A Tool for Restructuring and Development”, *Thunderbird International Business Review*, vol. 42, no.4, pp.445-465

Hallak, J.C. and Sivadasan, J. (2011) “Firms' exporting behavior under quality constraints”, Working Paper no.628, Research Seminar in International Economics

Hallak, J.C. and Schott, P.K. (2008) "Estimating Cross-Country Differences in Product Quality," NBER Working Papers 13807, National Bureau of Economic Research, Inc.

Hallak, J.C., and Schott, P.K. (2011) “Estimating Cross-Country Differences in Product Quality”, *The Quarterly Journal of Economics*, vol.126, no.1, pp.417-474

Hausmann, R., Hwang, J. and Rodrik, D. (2007), "What you export matters", *Journal of Economic Growth*, vol. 12, no.1, pp.1–25

Helpman, E., Melitz, M.J., Yeaple, S.R. (2004) “Export Versus FDI with Heterogenous Firms”, *The American Economic Review*, vol. 94, no.1, pp.300-316

Hidalgo, C. and Hausmann, R. (2009) “The building blocks of economic complexity”,

Proceedings of the National Academy of Sciences of the United States of America, vol.106, no.26, pp. 10570–10575

Hill, T. (2000) *Manufacturing strategy : text and cases*, Boston, Mass: Irwin/McGraw-Hill.

Hummels, D. and Klenow, P.J. (2005) "The Variety and Quality of a Nation's Exports", *American Economic Review*, vol.95, no.3, pp.704-723

Humphrey, J., and Schmitz, H. (2002), "How does insertion in global value chains affect upgrading in industrial clusters?", *Regional Studies*, vol. 36, no.9, pp.1017–1028

Iacovone, L. and Javorcik, B. (2012) "Getting Ready: Preparation for Exporting" CEPR Discussion Papers 8926, C.E.P.R. Discussion Papers

Isgut, A. (2001) "What's different about exporters? Evidence from Colombian manufacturing", *Journal of Development Studies*, vol.37, no.5, pp.57-82

IVV – Instituto da Vinha e do Vinho, I.P. (2008), "Estudo de imagem e de posicionamento dos Vinhos Portugueses", Ministério da Agricultura, do Desenvolvimento Rural e das Pescas

IVV – Instituto da Vinha e do Vinho, I.P. (2009), "Factos e números nº2 – Comércio Externo: Mercados de Exportação", Ministério da Agricultura, do Desenvolvimento Rural e das Pescas

IVV – Instituto da Vinha e do Vinho, I.P. (2012), "Factos e números nº6 – Situação Mundial da Vitivinicultura", Ministério da Agricultura, do Desenvolvimento Rural e das Pescas

Jensen, P. H. and Webster, E. (2009) "Another look at the relationship between innovation proxies", *Australian Economic Papers*, vol.48, no.3, pp.252-269

Johnson (2012) "Trade and prices with heterogeneous firms", *Journal of International Economics*, vol.86, no.1, pp.43-56

Kadarusman,Y. and Nadvi, K. (2013) "Competitiveness and Technological Upgrading in Global Value Chains: Evidence from the Indonesian Electronics and Garment Sectors", *European Planning Studies*, vol. 21, no.7, pp.1007-1028

Kaplinsky, R. (2000) "Globalisation and unequalisation: What can be learned from value chain analysis?", *Journal of Development Studies*, vol.37, no.2, pp.117-46

Kaplinsky, R. and Morris, M. (2002), *A Handbook for Value Chain Research*, International Development Research Center (IDRC), Electronic access:

http://asiandrivers.open.ac.uk/documents/Value_chain_Handbook_RKMM_Nov_2001.pdf, accessed on October 16th 2013

Kaplinsky, R., Morris, M. and Readman, J. (2002) "Understanding upgrading using the value chain analysis", BAM 2002, 9-11 Sep 2002, London, UK. Electronic access: http://eprints.brighton.ac.uk/876/, accessed on October 16th 2013

Keesing, D.B. and Lall, S. (1992) "Marketing, manufactured exports from developing countries: learning sequences and public support", in *Trade Policy, Industrialization, and Development: New Perspectives*. Oxford: Clarendon Press

Khandelwal, A. (2010), "The Long and Short (of) Quality Ladders", *Review of Economic Studies*, vol.77, no.4, pp.1450–1476

Kramer, M. (2014) "Is Portugal the Most Exciting Wine Place on the Planet Today?", *Wine Spectator*, March 18th, Electronic access: http://www.winespectator.com/webfeature/show/id/49719, accessed on March 25th 2014

Krugman, P. (1980) "Scale Economies, Product Differentiation, and the Pattern of Trade", *The American Economic Review*, vol. 70, no.5, pp.950-959

Kugler, M. and Verhoogen, E. (2012) "Prices, Plant Size, and Product Quality", *Review of Economic Studies*, vol.79, no.1, pp.307-339

Lains, P. (2003a) "New wine in old bottles: output and productivity trends in Portuguese agriculture, 1850-1959", *European Review of Economic History*, vol.7, no.1, pp.43-72

Lains, P. (2003b) "Portugal's Growth Paradox, 1870-1950", Working Paper no.135, Faculdade de Economia da Universidade do Porto

Lee, J. and J. Chen (2000), "Dynamic Synergy Creation with Multiple Business Activities: Toward a Competence-based Growth Model for Contract Manufacturers", in Sanchez and A. Heene (eds.) *Research in Competence-based Research, Advances in Applied Business Strategy Series*, Vol. C, pp.209-228, JAI Press.

López, R.A. (2005) "Trade and growth: reconciling the macroeconomic and microeconomic evidence", *Journal of Economic Surveys*, vol.19, no.4, pp.623-648

Ludington, C. (2013) *The Politics of Wine in Britain: A New Cultural History*, Palgrave Macmillan

Manova, K and Zhang, Z. (2009) "Quality heterogeneity across firms and export destinations", NBER Working Papers 15342, National Bureau of Economic Research, Inc.

Martin, J. and Méjean, I. (2011), "Low-wage countries' competition, reallocation across firms and the quality content of exports", Working Paper nº20, Paris School of Economics

Marcus, K. (2005) "Progress at Portugal's Table", *Wine Spectator*, June 30th, Electronic access: http://www.winespectator.com/magazine/show/id/11085, accessed on April 22nd

Matthews, G., Milroy, E., Thompson, K., Woska, D. and Blake, C. (2004) *Wines of the World*, London: Dorling Kindersley

McDermott, G. A. (2007) "The Politics of Institutional Renovation and Economic Upgrading: Recombining the Vines That Bind in Argentina", *Politics & Society*, vol. 35, no.1, pp.103-144.

Melitz, M.J. (2003), "The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity", *Econometrica*, vol. 51, no.6, pp.1695-1725

Melitz, M. J. and Ottaviano, G. (2005), "Market size, trade and productivity", Working Paper nº11393, National Bureau of Economic Research

Mendonça, S., Pereira, T. S. and Godinho, M.M. (2004) "Trademarks as an indicator of innovation and industrial change", *Research Policy*, vol. 33, no.9, pp.1385-404

Millot, V. (2012) "Trade mark Strategies and Innovative Behaviour", Doctoral thesis presented to the University of Strasbourg.

Monitor Group (2003) *"*Activar a Estratégia do Cluster do Vinho", *ViniPortugal*, Electronic access http://clubedovinhodoporto.com.sapo.pt/pdfs/Activar%20a%20Estrat%E9gia%20do%20Cluster%20do%20Vinho%20-%20Michael%20Porter.pdf, accessed on April 21st 2014

Muhr, D. and Rebelo, J. (2011) "Innovation in Wine SMEs: The Portuguese Douro Boys", Working Paper no. 84, American Association of Wine Economists

Niepoort (n.d.) "Fabulous Red and White Wine", Electronic Access: http://www.niepoort-vinhos.com/en/fabulous, accessed on April 22nd 2014

OIV - International Organisation of Vine and Wine (2013), "Statistical report on world viticulture", Electronic access:

http://www.oiv.int/oiv/info/enstatistiquessecteurvitivinicole?lang=en, accessed on December 13th 2013

Pessoa, A. (2008) "Tourism and Regional Competitiveness: the Case of the Portuguese Douro Valley," FEP Working Papers 299, Universidade do Porto, Faculdade de Economia do Porto.

Pietrobelli, C., and Rabellotti, R. (2004) "Upgrading in clusters and value chains in Latin America: The role of policies", *Sustainable Development Department Best Practices Series*. Washington, DC: Inter-American Development Bank.

Pipkin, S. (2011) "Local means in value chain ends: Dynamics of product and social upgrading in apparel manufacturing in Guatemala and Colombia", *World Development*, vol. 39, no.12, pp.2119-2131

Poncet, S. and Starosta de Waldemar, F. (2013) "Export upgrading and growth: The prerequisite of domestic embeddedness", *World Development*, vol. 51, pp.1-15

Ponte, S. (2007) "South African wine – An industry in ferment", TRALAC Working Paper 2007/8. Stellenbosch: Trade Law Centre for Southern Africa.

Ponte, S. (2009) "Governing through quality: Conventions and supply relations in the value chain for South African wine", *Sociologia Ruralis*, vol.49, no.3, pp.236-257

Ponte, S. and Ewert, J. (2009) "Which Way is ''Up" in Upgrading? Trajectories of Change in the Value Chain for South African Wine", *World Development*, vol. 36, no.10, pp.1637–1650

Porter, M. (1990) "The Competitive Advantage of Nations." *Harvard Business Review*, vol.68, no. 2, pp.71-91

Porter, M. (1985) *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: Free Press

Remaud, H. and Courdec, J. (2006) "Wine Business Practices: A New Versus Old Wine World Perspective", *Agribusiness*, vol.22, no.3, pp.405-416

Rosas, F. (1991) "Rafael Duque e a Política Agrária do Estado Novo (1934-44)", *Análise Social*, vol.26, no.112-113, pp.771-790

Rossi, A. (2013) "Does Economic Upgrading Lead to Social Upgrading in Global Production Networks? Evidence from Morocco", *World Development*, vol.46 , pp.223-233

Schautschick, P. and C. Greenhalgh (2013), "Empirical studies of trademarks – the existing economic literature", Department of Economics Discussion Paper Series (Ref: 659), University of Oxford

Schott, P.K. (2004) "Across-Product versus Within-Product Specialization in International Trade", *Quarterly Journal of Economics*, vol.119, no.2, pp.647–78

Taylor's (n.d.) "History of Port", Electronic access: http://taylor.pt/en/what-is-port-wine/history-of-port, accessed on January 25th 2014

Trienekens, J.H. (2011) "Agricultural Value Chains in Developing Countries: A Framework for Analysis", *International Food and Agribusiness Management Review*, vol.14, no.2, pp.51-82

Turismo de Portugal, I.P. (2013) "Plano Estratégico Nacional do Turismo", Governo de Portugal, Ministério da Economia e do Emprego

Unwin, T. (1991) *Wine and the Vine: An Historical Geography of Viticulture and the Wine Trade*, London, New York: Routledge

Van Hove, J. (2010) "Variety and quality in intra-European manufacturing trade: the impact of innovation and technological spillovers", *Journal of Economic Policy Reform*, vol.13, no.1, pp.43-59

Verhoogen, E. (2008) "Trade, quality upgrading, and wage inequality in the Mexican manufacturing sectors", *Quarterly Journal of Economics*, vol.123, no.2, pp. 489–530

ViniPortugal (2011) "Plano estratégico para a internacionalização do sector dos vinhos de Portugal", Electronic access: http://www.viniportugal.pt/docs/default-source/promo%C3%A7%C3%A3o-internacional/estrat%C3%A9gia-internacionaliza%C3%A7%C3%A3o-vinhos-de-portugal.pdf?sfvrsn=8, accessed on June 25th 2014

Westphal, L., Rhee, Y. and Pursell, G. (1984) "Sources of technological capability in South Korea", in Fransman, M. and King, K. (eds.) *Technological Capability in the Third World*, p. 279-300, London: Macmillan

Wine Spectator (n.d.) *The Top 100 Lists – About the List*, Electronic access: http://2013.top100.winespectator.com/list/, accessed on March 10th 2014

Wines of Portugal (2014) *Wine Regions*, Electronic access: http://winesofportugal.info/pagina.php?codNode=18012&market=2, accessed on March 25th 2014

World Bank (1991) *World Development Report: The Challenge of Development*, New York: Oxford University Press

World Bank (1993) *The East Asian Miracle. Economic Growth and Public Policy*, New York: Oxford University Press

WTO - World Trade Organization (2013) *The World Trade Report 2013:Factors Shaping the Future of World Trade*, Electronic access: http://www.wto.org/english/res_e/booksp_e/world_trade_report13_e.pdf, accessed on October 30th 2013

Appendix

Table 15: Surface under vine over total land area (in per cent), 2012

	Surface under vine (1000 ha)	Total land area (1000 ha)	% of surface under vine over total land area	Ranking (% of surface under vine over total land area)
Argentina	221	273669	0,081	12
Australia	169	768230	0,022	15
Brazil	91	845942	0,011	16
Chile	205	74381	0,276	9
China	570	956990	0,060	13
France	800	64043	1,249	4
Greece	110	13065	0,842	6
Hungary	64	8961	0,714	7
Italy	769	29414	2,614	1
New Zealand	37	26771	0,138	10
Portugal	239	9147	2,613	2
Romania	205	22989	0,892	5
South Africa	131	121447	0,108	11
Spain	1018	49898	2,040	3
Turkey	517	76963	0,672	8
USA	407	916197	0,044	14

Note: the countries mentioned are those identified in OIV, 2013, p.10.

Sources: OIV, 2013 and CIA World Factbook.

Table 16: Portuguese wines in Wine Spectator TOP 100

Year	No. Portuguese Wines	Rank	Name
1988	0		
1989	0		
1990	0		
1991	1	80	Graham Vintage Port Malvedos
1992	0		
1993	0		
1994	3	9	Croft Vintage Port
		24	Fonseca Vintage Port Guimaraens
		29	Graham Vintage Port
1995	3	4	Fonseca Vintage Port
		18	Taylor Fladgate Vintage Port
		35	Quinta do Vesuvio Vintage Port
1996	1	15	Niepoort Tawny Port Colheita
1997	3	1	Fonseca Vintage Port
		1	Taylor Fladgate Vintage Port
		15	Warre Vintage Port
1998	3	4	Quinta do Vesuvio Vintage Port
		8	Warre Vintage Port Quinta da Cavadinha
		9	Fonseca Vintage Port Guimaraens
1999	0		
2000	2	14	Niepoort Vintage Port
		25	Dow Vintage Port
2001	1	84	Quinta do Noval Late Bottled Port
2002	1	78	Quinta do Vallado Douro
2003	1	9	Graham Vintage Port
2004	1	20	Quinta do Vale Meão Douro
2005	2	27	Quinta do Vallado Douro Reserva
		55	Quinta de Roriz Douro Prazo
2006	4	18	Quinta do Vale Meão Douro
		47	Quinta do Crasto Douro Reserva Old Vines
		69	Churchill Douro Churchill Estates
		97	Symington Family Douro Altano Reserva
2007	2	38	Quinta do Infantado Douro Reserva
		64	Quinta do Vale Meão Douro Meandro
2008	3	3	Quinta do Crasto Douro Reserva Old Vines
		57	Sogrape Dão Callabriga
		90	Churchill Douro Churchill Estates
2009	2	48	Quinta do Vale Meão Douro Meandro
		88	Churchill Touriga Nacional Douro
2010	3	9	CARM Douro Reserva
		14	Dow Vintage Port
		22	Quinta do Vallado Douro Reserva
2011	4	7	Quinta do Vallado Touriga Nacional Douro
		42	Quinta de Cabriz Dão

		62 Quinta do Crasto Douro Reserva Old Vines
		64 Quinta do Vale Meão Douro
2012	2	13 Quinta do Vallado Touriga Nacional Douro
		20 Poças Junior Vintage Port
2013	4	13 Croft Vintage Port
		37 Quinta do Passadouro Douro
		81 Quinta do Crasto Douro Reserva Old Vines
		87 Graham Tawny Port 20 Year Old

Source: Wine Spectator